Reference Series Manual

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Mission Statement

Committed to excellence

ZAPCO is dedicated to the pursuit of audio fidelity. Our prime objectives are to design and manufacture audio products of unsurpassed quality, to provide unparalleled support and service for these products, and to conduct business in a manner that will enhance the quality of life for all involved.

Experience:
Knowledge from doing

There is absolutely no substitute for experience; that is a simple fact of life. Another simple fact is that ZAPCO has, for over thirty years, been the leader in defining quality standards for the car audio industry. These years of experience have led to a thorough understanding of the challenges that are unique to the world of car audio. ZAPCO's relentless quest for sonic purity consistently yields imaginative designs that utilize the most innovative technologies. The resulting products set the criteria by which all others in the industry are judged.

ZAPCO
The Reference Series

The Reference series (originally called AG) marked ZAPCO's first effort to bring the high quality that built the ZAPCO legend to an amplifier line that everyone can afford. The response has exceeded the company's wildest expectations. Why has the line been received so well? We think the answer is simple. The Reference Series amplifiers sound as good as, or better than, other brands best amplifiers. This is possible because we took a very different approach in the design of our Reference Series.

Rather than follow the crowd and build a less expensive amplifier around cheaper components, ZAPCO chose to develop a more efficient way to build the best, high voltage, amp on the market. The Reference Series was modeled after the Studio Series including the same circuit design, Op-Amps, Gate Drive Boost circuit, 1%, metal film resistors and high current, Bi-Polar outputs devices. One major improvement was the addition of SymbiLink™ balanced line inputs.

Did we make any sacrifices to achieve this new Series? Certainly, and these fall in two areas. First, we gave up a certain amount of headroom. In the Studio Series, every model was overbuilt by 100%. The Studio amplifiers had twice as many output devices as it needed to run full power on all day long. The Reference Series amplifiers have only 1½ times the outputs devices required. We still overbuild the Reference Series by 50%, just not as much as the Studio. This is a difference that will almost never be heard. The other sacrifice we made was in size. The Studio 500, for example was probably the world's smallest, 900-watt (only 19"L x 5.75W), class A/B, amplifier. The Reference 1100.1 is 23"L x 7.5"W, which is more in line with what people might expect from that much power. While the smaller size can be more convenient, it took much more time to build.

So! We gave up a little headroom and we had to deal with a larger footprint. In return, we got a very neat design with an inordinate amount of extremely clean power at a price that made it an incredible value. While the great price and clean power made the Reference an obvious choice, we were not content to just make a more affordable series.

The Reference amplifiers received all of the features that we felt were missing from the older Studio design. Every Reference amplifier has a fully variable electronic crossover that can be switched to high pass or low pass, and an input switch for stereo, summed mono, or bridged use. Every Reference amplifier has an adjustable bass EQ control. And, perhaps most significant difference is the addition of SymbiLink™ Balanced Line inputs for a lower noise floor, better dynamic range, and less signal loss on long runs.

We also include with every model of amplifier our SLDIN-T.F (transmitter line driver) providing a method of changing an unbalanced signal to balanced and the ability to increase line level voltage up to 4-times the output. The only accessory item to complete your system is the proper length cable from the transmitter to the amplifier. Everyone will get balanced…for free!

What's next? Only time will tell. But here's one thing you can count on. As ZAPCO finds new ways to improve the state of the art, we will bring them to you immediately, in all our products.

So! Enjoy this manual. We hope you will read it thoroughly. We have tried to include all the necessary information for proper installation and set up so that you can enjoy the full potential of your ZAPCO Reference Series amplifier.

Sonic Purity

Our Dedication to Sonic Purity Requires the Highest Quality Internal Components are used.

- **Resistors**

All resistors (other than power resistors) are 1% precision low noise metal film. This is a key reason why ZAPCO products have the industries' best low noise specifications, and why you won't see as much fluctuation in our test certificates as you will other brands. Precision resistors also reduce distortion and improve channel matching.

- **Capacitors**

Capacitors are similar to batteries. Like a battery, they store energy and have electrolyte (internal fluid). Also like a battery, a capacitor *can* have a very limited life. "Computer grade" capacitors for example, are reliable only in cool environments with very little current applied to them. Only the best high current and high temperature capacitors should be used in an auto-sound application. Although these capacitors typically cost five times as much as those commonly used in other brands, ZAPCO insists that no audio degradation will occur over time.

- **Transistors**

Two types of transistors are used in ZAPCO products, bipolar and MOSFET. MOSFET transistors are rugged, high current output devices that are best suited as switches. They are *the* choice for switching power supplies. They are however, very non-linear and are not suitable for use as audio outputs. They cannot be matched and their inherent distortion requires too much feedback to achieve reasonable distortion levels. Bipolar output transistors are used exclusively in the audio stage of all Reference Series amplifiers. The audio performance of a bipolar transistor heavily outweighs any minor advantages a MOSFET might offer regarding durability. We solve the durability concerns by simply using more output devices than the amplifier requires. This gives us a bulletproof amp with the sound quality we demand of a ZAPCO product.

- **Transformers**

Most of the transformers used in our products are hand-wound to ensure maximum quality. This provides a guarantee that current capability, efficiency, and radiated noise are all kept within our demanding parameters. Another critical aspect of the transformer is mounting; all transformers are securely mounted in their respective chassis. Transformers are massive, and if not securely mounted can cause failure among internal components due to vibration.

- **Power Supplies**

Regulated or Unregulated? For years amplifier designers have debated which type of power supply is best. What's the truth about power supplies? They each have advantages and disadvantages and there is no, one, best type. Limiting yourself to one type of power supply limits your amplifier design flexibility. ZAPCO uses both types of power supplies depending on the intended use of each amplifier, as well as expected current demands and operating environment.

SymbiLink™ Balanced System

The most natural configuration for an audio system in the automobile places the signal source in the dash with the amplifiers located some distance away, usually under the seat or in the trunk of the vehicle. The reality of this arrangement dictates the necessity to make long runs of low level signal cable usually from the front to the back of the car. The electrical environment in an automobile is one that is inherently noisy and filled with conditions that threaten to degrade signal fidelity at every turn. Capacitive loading due to the long cable lengths, the potential for ground loops, alternator charging currents or currents generated by the amplifiers themselves are all factors that induce noise and distortion into the signal cables. By no means is this an ideal situation. Thankfully, ZAPCO has found the solution.

SymbiLink™ components convert a standard unbalanced audio signal into the fully balanced domain usually reserved for expensive professional audio equipment found in recording studios or at your local concert venue. After this conversion is made, the audio cabling becomes virtually immune to electrical interference in the surrounding environment and is much less susceptible to signal degradation over long cable runs. It is for this reason that balanced signal cables are common in professional or industrial applications. ZAPCO has made this technology available for your car. ZAPCO engineers also discovered that the pulsating D.C. current in the automobile chassis and amplifier power wiring caused a significant amount of low frequency distortion. ZAPCO's balanced SymbiLink™ technology completely eliminates this distortion.

Specifications You Can Hear

Our dedication to sonic purity, and to the concept of cumulative error demands that we design and build our amplifiers and processors to be the cleanest in the industry. ZAPCO amplifiers are the standard by which all other amplifiers are measured. However, it concerns us when one specification THD (Total Harmonic Distortion) that can't be heard in most modern, high-end amplifiers becomes the only meaningful specification manufacturers seem to publish. THD is only one of a number of specifications that make ZAPCO amplifiers sound better than other brands. Of the four primary specifications, it is probably the least obvious in normal use.

Damping Factor:

The most common misconception about ZAPCO amplifiers is that we drastically under-rate our power output. Not true, it just sounds that way. Today's music, of all genres, has a great deal of bass content. Damping describes the amps ability to control a woofer. An amp with poor damping will leave bass notes sounding soft and undefined, regardless of its power. In most amp lines, the largest units have damping factors between 100 and 200. Since rock solid bass is perceived as a function of power, our 100-watt amp sounds like other brands 300-watt amps.

Slew Rate:

A similar situation exists in the higher frequencies. Ever turn up the volume and hear cymbals sounding like fingernails on a blackboard? That's because the amplifier simply wasn't fast enough to accurately reproduce the high frequency tonality of the cymbals. A higher slew rate means a faster amplifier, which means crystal clear high frequency reproduction. ZAPCO amps have the highest slew rates in the industry. Once again, clear defined, sound is perceived as a function of power.

Signal to Noise Ratio:

Noise is an ever-present problem in auto sound reproduction. ZAPCO approaches this problem in two ways. The first is at the input source. All Reference amplifiers can use the SymbiLink™ balance line inputs, which drastically reduce the noise coming into the amp. Secondly, ZAPCO amps are built with the highest quality, lowest noise components available. We have the highest signal to noise ratios in the industry. The extra money we spend on better components is directly rewarded with better sound.

Stereo Separation:

The ability of an amplifier to maintain the separation between the right and left channels is what allows an amplifier to reproduce an accurate sound stage. Music is recorded with each instrument in its own location on a sound stage. You should hear it the same way in your vehicle.

Results:

To assure that no ZAPCO product ever fails to meet our level of expectation, we must build all products to exceed our specifications by a comfortable margin. Our superior design and construction give our amplifiers advantages that go beyond power output and provide a sound quality difference you will hear the moment you turn your system on.

A WORD ABOUT "WEIGHTED" SPECIFICATIONS

Most of the time, when you see specifications, they will be preceded by the term "A" weighted. "A" weighting is a way of coloring numbers to make specifications look better.

About the only place you can find specs that aren't "A" weighted is in ZAPCO manuals and literature. We publish only "raw" specs at ZAPCO. If we don't like the specifications of one of our products we'll make it better, not try to make the numbers look better.

Warnings

ZAPCO highly recommends that a fuse or circuit breaker be placed within 18" of the battery. Although products have adequate internal protection, it is possible that a pinched power wire between the component and the battery may result in a fire. The protection device should be placed where it can be accessed easily and all wiring should be routed safely and correctly according to the following guidelines:

Do not run wiring close to hot or spinning objects.

Always use wire grommets when routing wire through the firewall or any other metal panels.

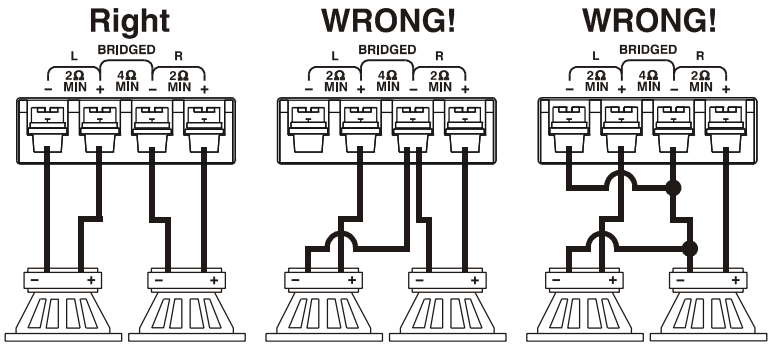
Make sure that the potential for pinched wiring is avoided by routing all wires away from moving hinges and seats. This also includes brake, gas and clutch pedals, hood and trunk hinges, etc.

Caution:

Continuous exposure to excessive sound pressure levels may cause permanent hearing loss. ZAPCO strongly advises that you use common sense when setting volume levels. If you experience ringing in the ears, it could cause permanent hearing damage!

CAUTION!

When connecting our amplifiers to pre-wired stock speakers, care must be taken that there are no common connections between left and right speaker wires, i.e. minus to minus or plus to plus connections, as this will cause the amplifier to go into immediate protection or may cause damage to the amplifier. Output connections are not common chassis ground. Please follow the hookup instructions in this owner's manual. Any questions should be directed to your local ZAPCO dealer or call us at 209-577-4268.



Wire Size

Most people understand the importance of a clean signal source for good sound reproduction. But, what about your 12 volt power source? It's often surprising how many people (even professional car audio people) will obsess about signal wire but routinely provide the amplifier only a fraction of the current it needs to do its job. The most common wire gauge used in car audio is 10-gauge. The most common location for amplifiers is in the trunk.

Take a look at the chart below. If you want to have any respectable amount of power for your amp, you need an 8-gauge wire to the trunk as a **bare minimum.** If you want enough power to drive woofers, you're going to need at least a 4-gauge wire to the rear.

	Length of Run							
	0- 4 Ft	**4 - 7 Ft**	**7 - 10 Ft**	**10 - 13 Ft**	**13 - 16 Ft**	**16 - 19 Ft**	**19 - 22 Ft**	**22 - 28 Ft**
Current Demand								
0 - 20 amps	14	12	12	10	10	8	8	8
20 - 35 amps	12	10	8	8	6	6	6	4
35 - 50 amps	10	8	8	6	6	4	4	4
50 - 60 amps	8	8	6	4	4	4	4	2
65 - 85 amps	6	6	4	4	2	2	2	0
85 - 105 amps	6	6	4	2	2	2	2	0
105 - 125 amps	4	4	4	2	2	0	0	0
125 - 150 amps	2	2	2	2	0	0	0	0

Lets look at a fairly small system. If you use a Reference 200.2 (25 amps) for the highs and a Reference 350.2 (40 amps) for the woofers, you need at least a 4-gauge wire to provide 65 amps at the trunk. Anything less and your car won't go boom. It'll just go Blap!

It takes lots of current to make lots of power!

And remember! An electrical circuit is just that…a circuit. For current to travel, you must complete the circuit from the positive terminal to the negative terminal. Whatever you use for power (B+) you must also use for Ground (B-). 4-gauge power wire…4-gauge ground wire!

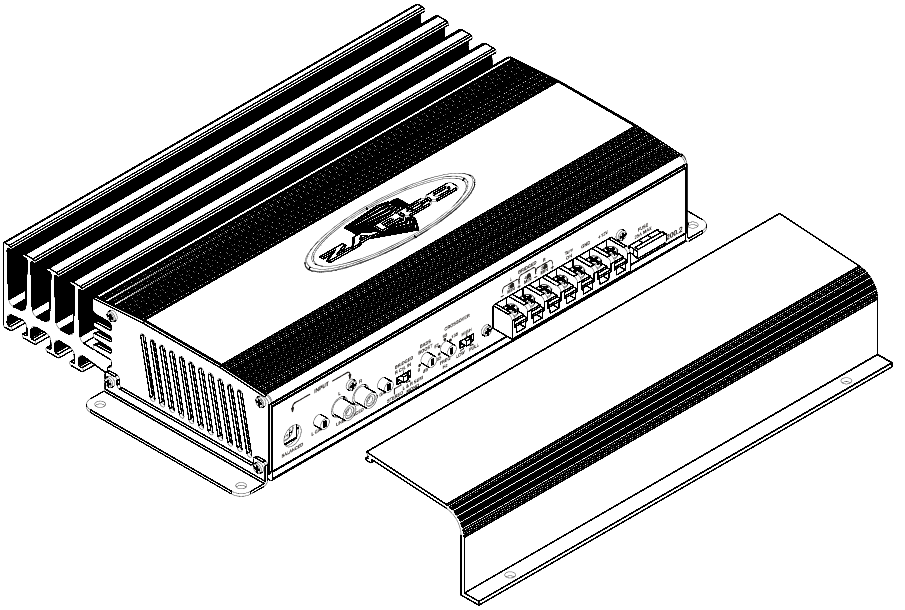
So! Use this supplied chart! Add up the fuse values on the amplifier(s) then choose the proper size wire based on the distance from the car battery to the amplifier location. Very important, always use the same gauge wire for the main ground as you do for the main power. Always make your ground as short as possible and attach to a clean solid surface.

Installation Guidelines

Mounting your Reference Amplifier is easy. Keep in mind the following guidelines:

- The amplifier may be mounted in any direction, on wood, metal or carpet.
- The metal case of the amplifier may be grounded or left isolated.
- The amplifier requires adequate ventilation. Position the amplifier with sufficient surrounding area for proper cooling.
- Keep fan and vent endplates clear for proper internal cooling.
- Keep the amplifier out of the engine compartment and other locations that may cause excessive heat or moisture.
    - **Do not mount the amplifier to a subwoofer enclosure or any other place that may have excessive vibration!**

Reference Series Accessory



We believe the new textured pewter finish aluminum cover makes the Reference Series of amps among the best looking products available today. To dress up your installation and protect the connections from stray hands and feet we have connection covers available for all Reference Series amplifiers.

ZAPCO's legend hasn't always been built on the appearance of our products, but on technical innovations and sound quality. On the next several pages we will show you some of the differences that go beyond appearance, which affect the versatility and performance of the Reference Series amplifiers.

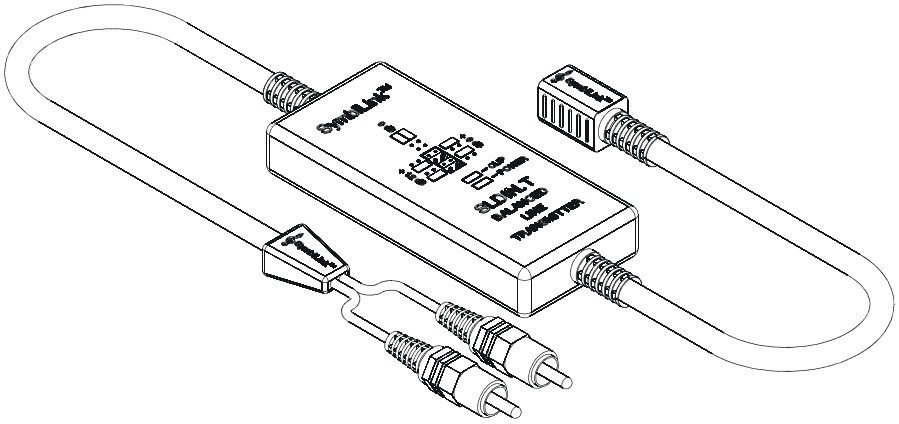
In – Line SymbiLink™ Transmitters

ZAPCO was the first Car Audio manufacturer to embrace balanced line signal transmission. There is a good deal of information in this manual that explains the how and why of SymbiLink™ balanced line technology.

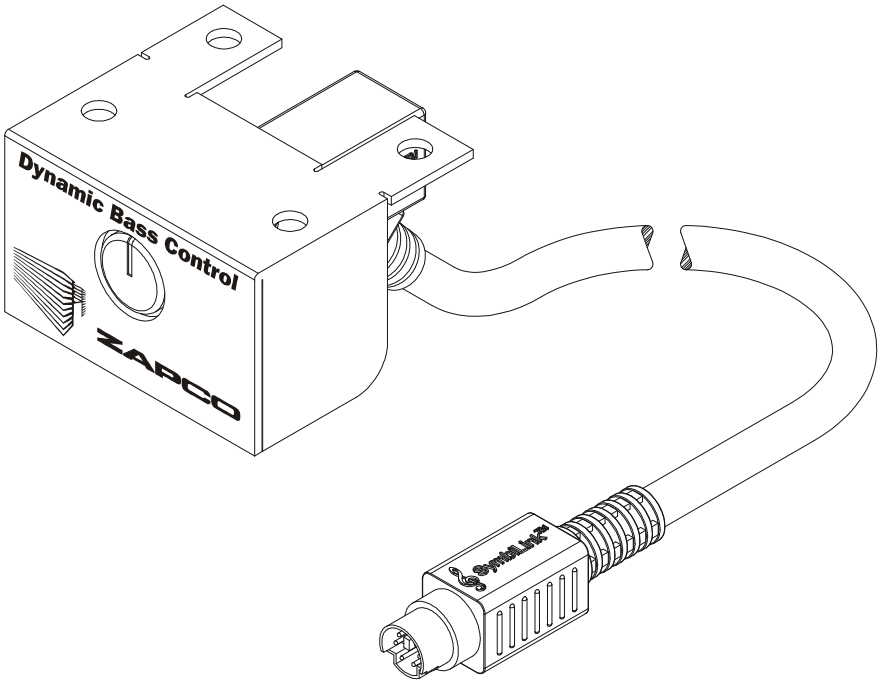
While Pro-Audio and High-End Home Audio manufacturers have adopted balanced line technology, the car audio market is still supporting the outdated RCA cable system. If SymbiLink™ is substituted for RCA the potential built into our products will go unrealized by many users.

To ensure that every ZAPCO Reference Series amplifier can realize its full potential we provide an SLDIN-T.F Balanced Line Transmitter with every amplifier. Built into this transmitter is also a line driver capable of boosting signal input up to 12dB (4-times) the output voltage of the source. This balanced line conversion will improve noise rejection, lower the inherent system noise floor, reduce distortion, and provide up to 16 volts of signal output.

Simply attach the SymbiLink™ cable to the transmitter in the length that fits your system and enjoy the sonic purity of SymbiLink™ Balanced Technology.



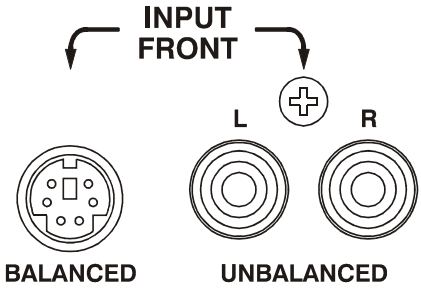
Dynamic Bass Control



ZAPCO offers a remote knob and mount for our bass equalization circuitry. The Reference 500.1, 1100.1 and 1000.4 amplifiers have a “Bass Boost” port on the control plate. Simply plug in the optional DBC (Dynamic Bass Control) and you can make instantaneous changes in the bass contour from the dash.

ZAPCO Reference Controls

Reference Series Inputs



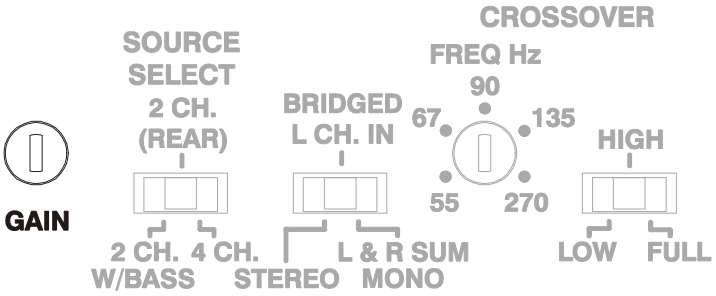
Some Reference Series amplifiers accept two distinct types of signal inputs.

The first is the standard RCA type of signal input. While they are not the best type of signal transmission, they certainly are the most common. RCA cables were the first standardized transmission system for audio signals, and have been around since the early days of phonographs and tape recorders.

RCAs work quite well for home systems, where you have short cable runs and few, if any, sources of induced noise. In a car environment, however, they have some very real problems. These problems include induced noise, harmonic distortion, system noise, and signal loss, due to the long cable runs common in car audio systems. Despite these drawbacks, RCAs have been around a long time and are very common, so, ZAPCO has provided them as a convenient option on some Reference Series amplifiers.

ZAPCO also gives you a better sounding option. A 6-pin Mini DIN connector that allows you to use the high voltage SymbiLink™ balanced line technology with all Reference Series amplifiers. Manufacturers of professional audio equipment and high-end home products discovered years ago that the problems inherent with RCAs could be eliminated, by using differential preamps in combination with balanced line transmission. ZAPCO one of the early adopters of balanced line technology incorporated our SymbiLink™ balanced line transmission system into all Reference Series amplifiers.

Setting Your Gains



Proper gain setting is one of the most important factors in setting up a stereo system. At the same time, gain setting is most often done wrong. Turning up the gain of an amp is the very last thing you should ever do to a system.

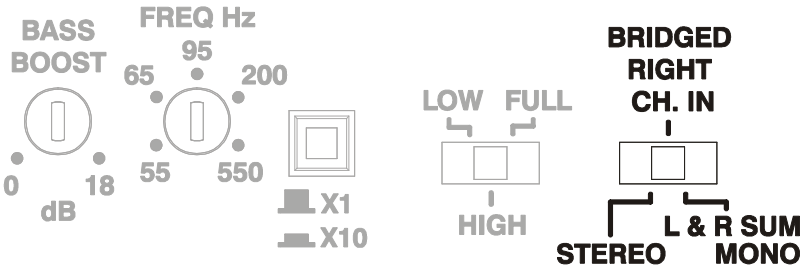
An amplifier is a step up transformer. Period. Any signal you put in is boosted by a fixed factor. Music, hiss, or any other noise, it doesn't matter.

A large number of noise problems are simply a matter of improper gain settings. The goal of gain setting is to achieve the maximum amount of musical output from the amplifier while getting the least amount of hiss or noise from the system.

Your Reference Series amplifier accepts an extremely wide range of input levels. As little as .25 volts on the RCAs to as much as 16 volts with SymbiLink™ balanced inputs. The basic gain setting is very simple and requires no special tools. Whether you have a simple system with a deck and an amp, or a system with a deck, line driver, equalizer, crossover, and amp, the procedure is always the same.

First, hook up the system with all gain controls at minimum (turn the gain pot fully counter-clockwise with a small screwdriver). Then turn on the head unit and turn up the volume. If you achieve clean sound, and, more volume than you want, you don't need to make any adjustments. However, if you turn up the volume and begin to hear distorted sound before it becomes loud, you are clipping (distorting) the deck (probably a little over ¾ volume). Turn the deck down just enough to hear clean sound again, and then move to the next component in your system. With the deck playing at "maximum clean volume" adjust the gain of the next component to its "maximum clean volume". If you adjust your gains this way, always starting at the head unit and working down the line to the amplifier, you will get the most performance out of your amplifier(s) with the least amount of unwanted distortion and noise.

Signal Mode Switch



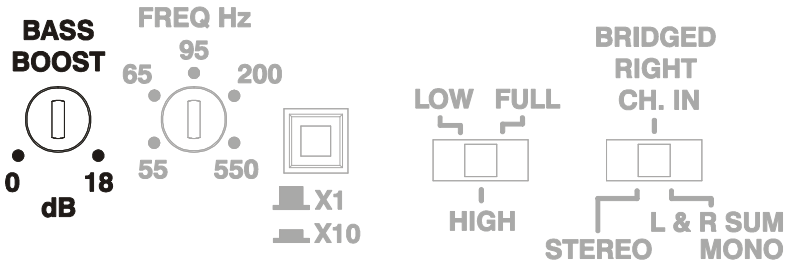
The Signal Mode Switch determines how the amplifier will treat the input signal. You'll notice that this is a three-position switch. The left position is the "Stereo" setting. The center position is the "Bridged R Ch In " setting. The right position is the "L+R Sum Mono setting.

The Stereo setting is the most common. This is the position you will use when the amplifier is going to drive both left and right speakers in a stereo system. While this will account for 90% of our users, ZAPCO has provided the Mode switch so the Reference Series amplifiers may also be used in more advanced systems.

The second most common setting is the far right position, "L & R Sum Mono". In this position, the input stage will combine the left channel and right channel information into a single mono channel, and feed that information to both sides of the amplifier. You can then bridge the outputs into a single bass channel or a single center channel. In both uses you will have a single channel with the information from both channels of input. NOTE: Left & Right Sum Mono is the position you will always use to drive woofers only.

The third (center) position is "R Bridged". This is the least common setting, and is used primarily in large competition systems. This setting takes information from the right input channel only and sends it to both sides of the amplifier. This allows you to completely eliminate crosstalk between channels by having separate right and left channel amplifiers. NOTE: This is only used with separate right and left channel amplifiers and is NOT the setting for woofer use.

Bass EQ Control

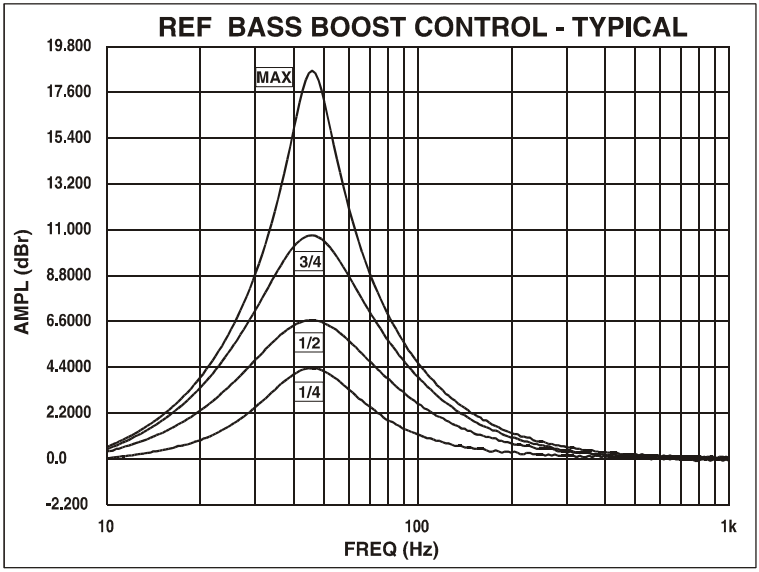


In vehicle sound systems they have a tendency to peak at about 100Hz to 120Hz and to roll off after that. This leaves a hole in the bass response in the 40Hz to 50Hz range.

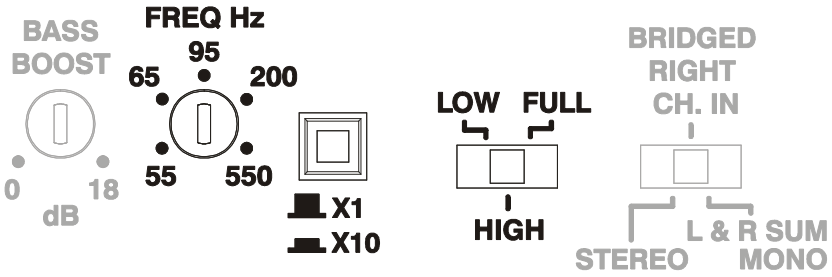
To compensate for this effect, ZAPCO has provided all Reference Series amplifiers with a variable Bass equalization circuit. Each amplifier has a “Bass Boost” control, which allows adjustment of the bass from 0dB to as much as 18dB. This adjustment is made at a frequency of 44Hz.

Use the Bass EQ with caution. Too much equalization can easily cause amplifier clipping and may even damage your speakers.

Bass Equalization Curves



The ZAPCO Crossover



All ZAPCO Reference series amplifiers have electronic crossovers built in. This allows you to build multi-amp systems without the need for added electronic crossovers. Rather than use the standard, on/off, fixed frequency crossover usually found on amplifiers, ZAPCO has chosen to use completely variable crossovers, which can be set for high pass, low pass, or full range use.

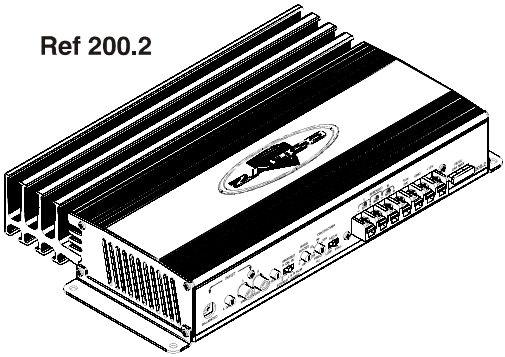
The “FREQ Hz” control allows the user to choose exactly what crossover frequency the amp will use. In the example above, the crossover is set at 95Hz and is set for high pass. Some of the Reference amplifiers have a range switch as well. By pushing the range switch “in” this will activate the X10 position, you will change the active range from 55Hz-550Hz to 550Hz-5.5kHz.

All Reference Series amplifiers use “State Variable” crossover design, to provide the most versatility, with the least effect on signal phase.

Some of the Reference Series amplifiers have multiple crossovers or special crossover controls for specific uses. These will be covered in the sections on these special amplifiers.

Reference Series 2 Channel Amplifiers

Ref 200.2



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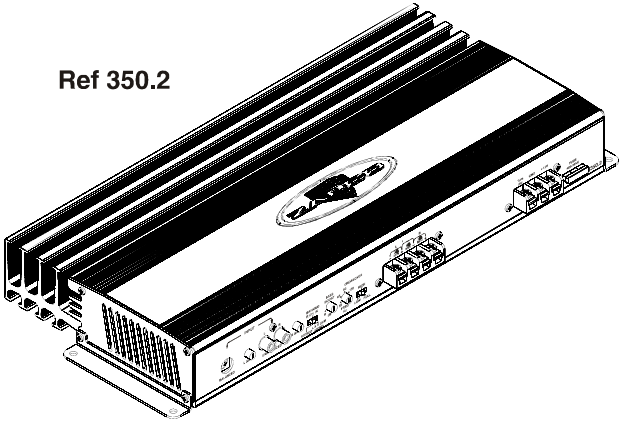

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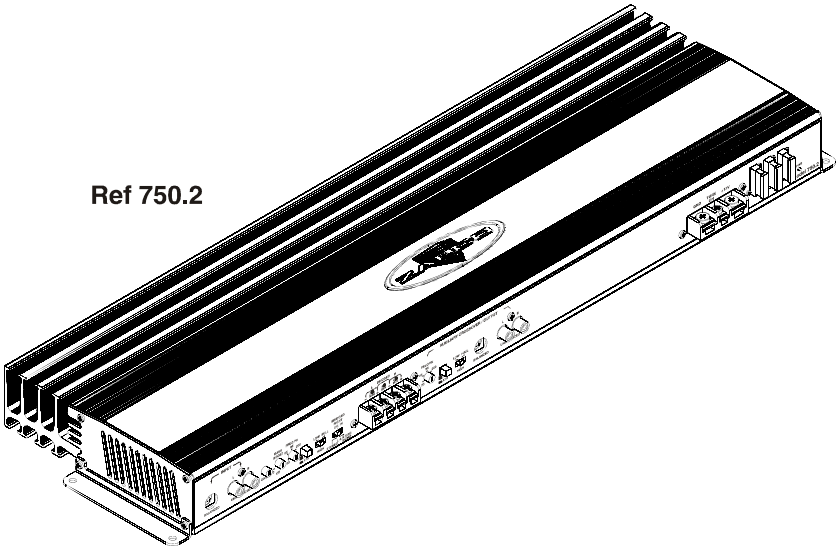
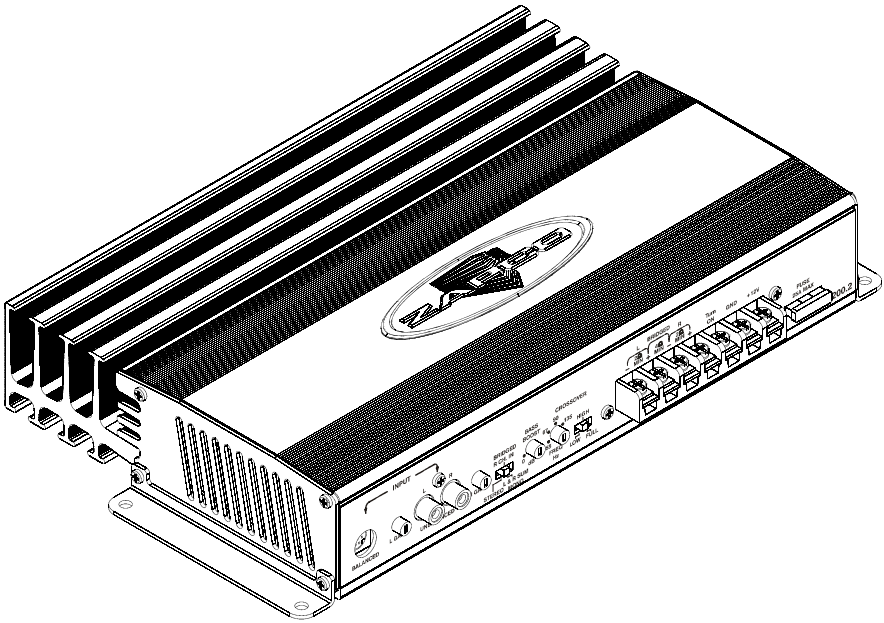
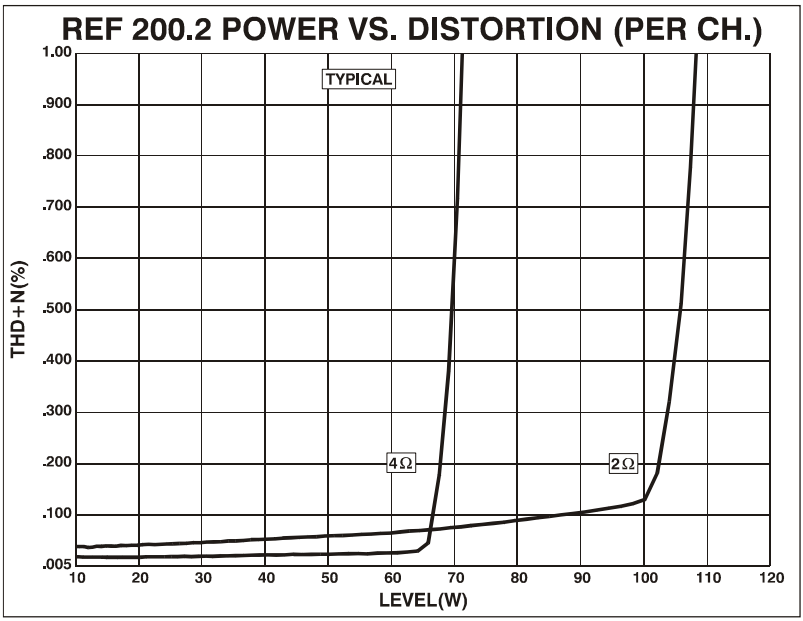


Reference 200.2

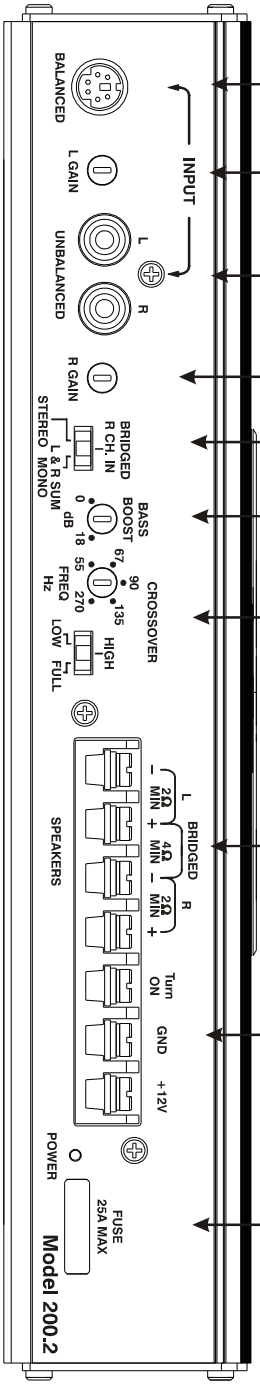




Reference 200.2 Specifications

Total Power (14.4V @ 1kHz)	Power
Dynamic (4Ω mono)	230 watts
.2% T.H.D.	205 watts
Rated Power / Channel	T.H.D.+N
50 watts x 2 @ 4Ω	< .025%
100 watts x 2 @ 2Ω	< .14%
Bridged Mono	
134 watts x 1 @ 8Ω	.046% T.H.D.
205 watts x 1 @ 4Ω	.12% T.H.D.
Frequency Response	20 – 20kHz, ± .12dB
S/N Ratio	> 95dB
Transient Distortion (4Ω, 40W)	< .01%
Slew Rate	> 23 V/μS
Damping Factor	> 166 @ 4Ω
Input Sensitivity	
Balanced (DIN)	500mV – 10V
Unbalanced (RCA)	250mV – 5V
Separation	> 64dB
Max. Current Requirements	26 Amps @ 200 watts
Idle Current	.84 Amps
Dimensions	11”L x 7.5”W x 1.95”H

Front Panel Layout



SymbiLink Balanced Input

Left Channel Gain Adjust

Unbalanced RCA Inputs

Right Channel Gain Adjust

Mode Switch: Selects stereo, right bridged or L+R sum (Center channel or mono bass).

Bass Boost: Adjust this control for 0 to +18 dB of bass boost. See "Bass Equalization" chart.

Crossover: Control and switch selects mode and frequency. See chart and specifications.

Speakers:
Connect a single 4 ohm load across the center contacts for 200 watts bridged output. Connect two 2 ohm loads for 2 x 100 watts.

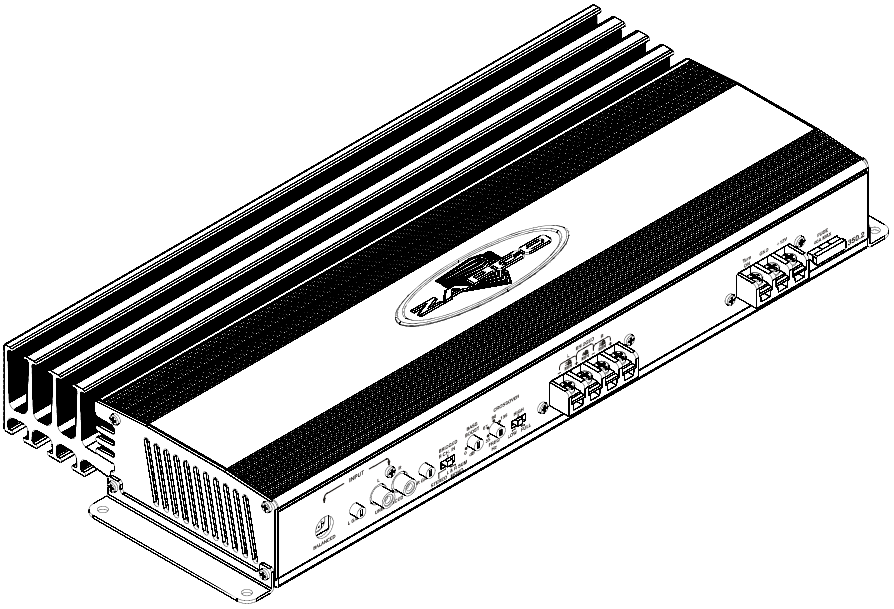
Power: Connect heavy (8 gauge min.) stranded wire to the 12 volt and ground source. Connect the ground to the auto chassis near the amplifier.

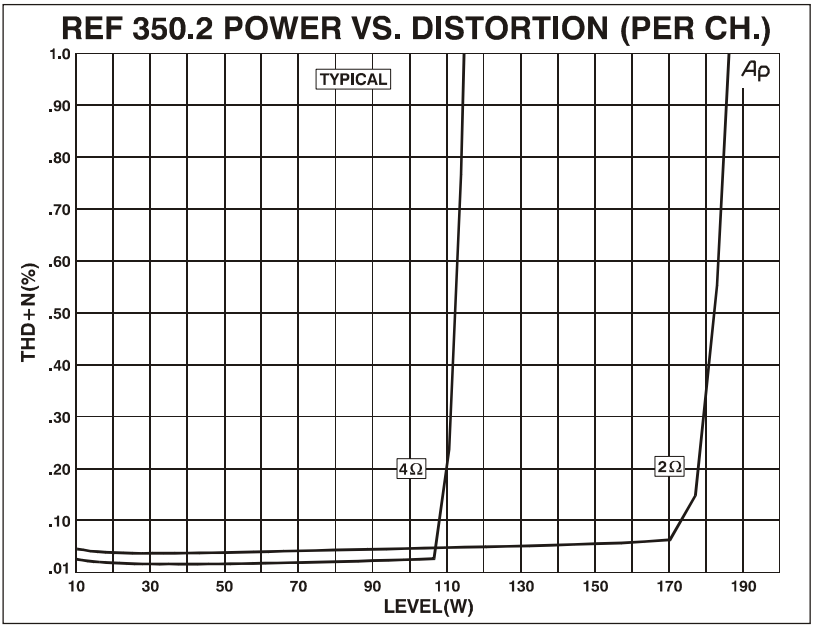
Fuse: Never replace with a fuse greater than 25 amperes.

Key Features

- SymbiLink™ Balanced Inputs
- RCA Unbalanced Inputs
- Two Ohm Stereo Stable
- 18 dB Variable Bass Boost Control
- Built in Variable Electronic Crossover
- Bridgeable
- Three Channel Capable
- High Current Bipolar Outputs
- Optically Isolated MOSFET Power Supply
- Quality ZAPCO Construction

Reference 350.2

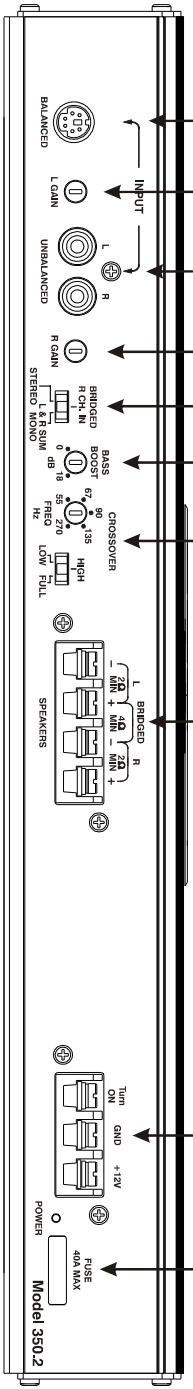




Reference 350.2 Specifications

Total Power (14.4V @ 1kHz)	Power
Dynamic (4Ω mono)	380 watts
.2% T.H.D.	350 watts
Rated Power / Channel	T.H.D.+N
100 watts x 2 @ 4Ω	< .025%
170 watts x 2 @ 2Ω	< .047%
Bridged Mono	
210 watts x 1 @ 8Ω	.046% T.H.D.
330 watts x 1 @ 4Ω	.12% T.H.D.
Frequency Response	20 – 20kHz, ± .25dB
S/N Ratio	> 96dB
Transient Distortion (4Ω, 40W)	< .015%
Slew Rate	> 29 V/μS
Damping Factor	> 200 @ 4Ω
Input Sensitivity	
Balanced (DIN)	500mV – 10V
Unbalanced (RCA)	250mV – 5V
Separation	> 66dB
Max. Current Requirements	42 Amps @ 350 watts
Idle Current	.93 Amps
Dimensions	15”L x 7.5”W x 1.95”H

Front Panel Layout



SymbiLink Balanced Input

Left Channel Gain Adjust

Unbalanced RCA Inputs

Right Channel Gain Adjust

Mode Switch: Selects stereo, right bridged or L+R sum (Center channel or mono bass).

Bass Boost: Adjust this control for 0 to +18 dB of bass boost. See "Bass Equalization" chart.

Crossover: Control and switch selects mode and frequency. See chart and specifications.

Speakers:
Connect a single 4 ohm load across the center contacts for 200 watts bridged output.
Connect two 2 ohm loads for 2 x 100 watts.

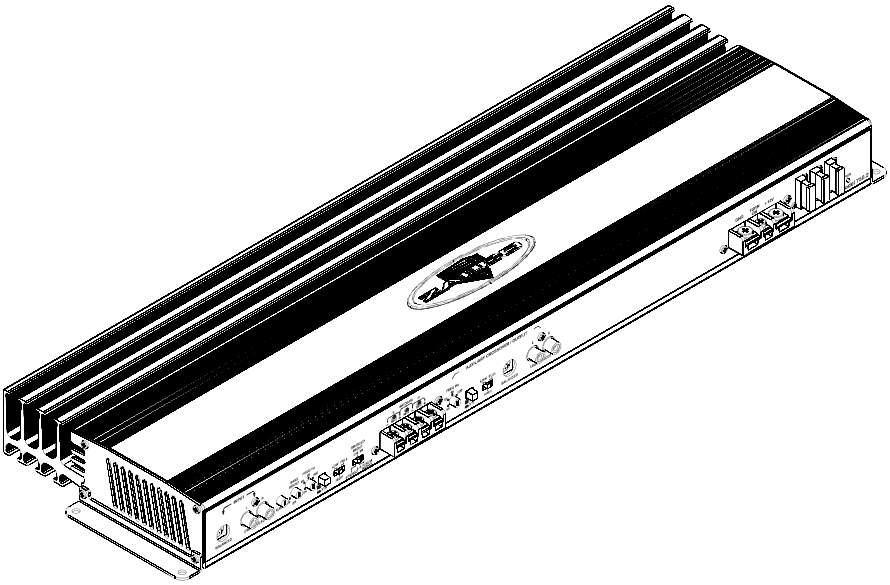
Power: Connect heavy (10 guage min.) stranded wire to the 12 volt and ground source. Connect the ground to the auto chassis near the amplifier.

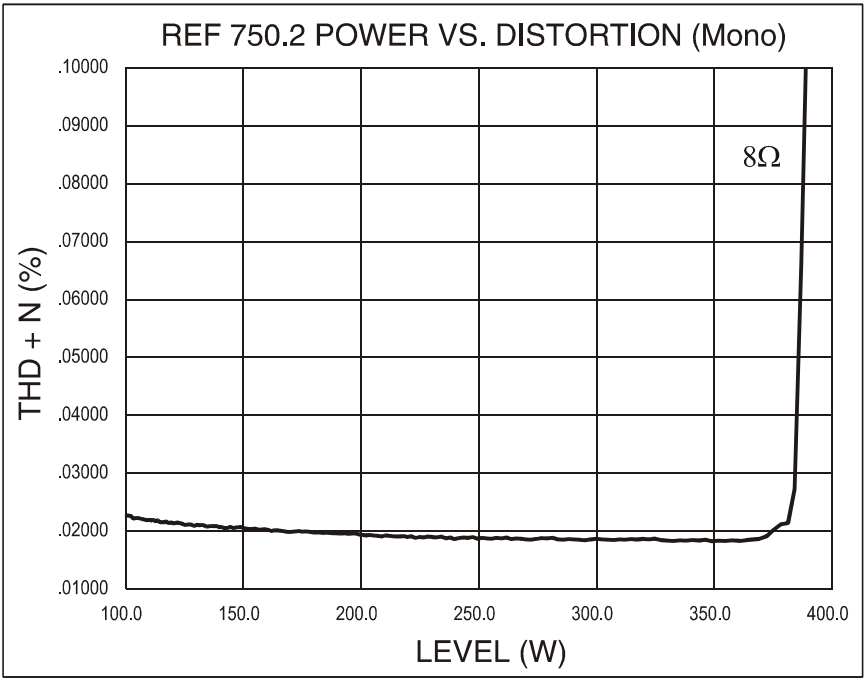
Fuse: Never replace with a fuse greater than 40 amperes.

Key Features

- SymbiLink™ Balanced Inputs
- RCA Unbalanced Inputs
- Two Ohm Stereo Stable
- 18 dB Variable Bass Boost Control
- Built in Variable Electronic Crossover
- Bridgeable
- Three Channel Capable
- High Current Bipolar Outputs
- Optically Isolated MOSFET Power Supply
- Quality ZAPCO Construction

Reference 750.2

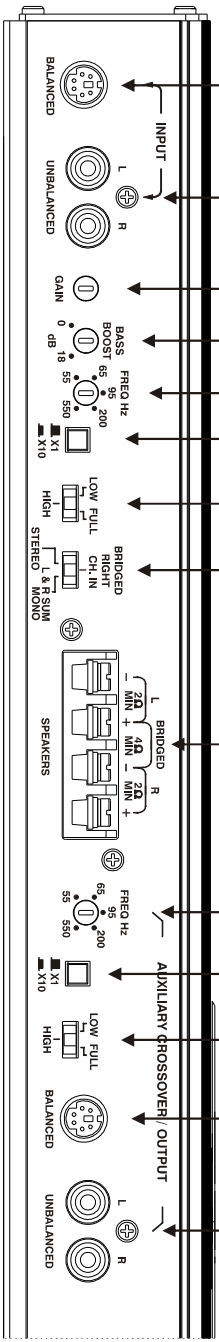




Reference 750.2 Specifications

Total Power (14.4V @ 1kHz)	Power
Rated Power / Channel	T.H.D.+N
175watts x 2 @ 4Ω	< .04%
360 watts x 2 @ 2Ω	< .05%
Bridged Mono	
780watts x 1 @ 4 Ω Mono	< .2%
Frequency Response	20 – 20kHz, + 0 / - .5dB
S/N Ratio	> 90dB
Transient Distortion (4Ω, 40W)	< .03%
Slew Rate	40 V/µS
Damping Factor	> 1000 @ 4Ω
Input Sensitivity	
Balanced (DIN)	560mV – 10V
Unbalanced (RCA)	260mV – 5V
Separation	> 60dB
Max. Current Requirements	120 Amps @ 750 watts
Idle Current	1.56 Amps
Dimensions	23”L x 7.5”W x 1.95”H

Front Panel Layouts



SymbiLink Balanced Input

Unbalanced RCA Inputs

Gain Adjustment

Bass Boost (0 to 18dB Gain)

Crossover (55 - 550 Hz)

Crossover x 10 (550 - 5.5 KHz)

Crossover Mode Select

Input Signal Mode Switch:
Stereo, Bridged, or Left and right Sum

Speaker Output:
2 Ohm Stereo (4 Ohm Mono) Minimum.

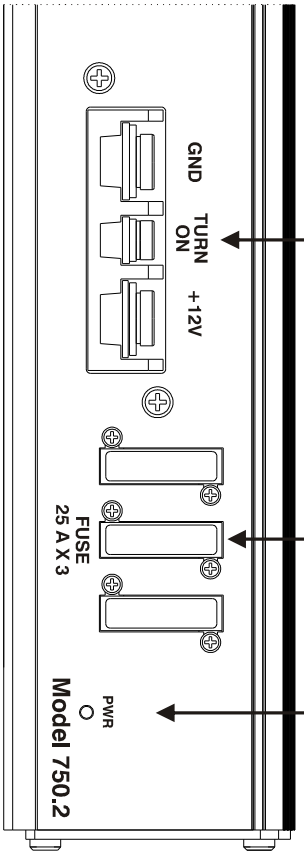
Crossover (55 - 550 Hz)

Crossover x 10 (550 - 5.5 KHz)

Crossover Mode Select

SymbiLink Balanced Output

Unbalanced RCA Outputs



12V Power Connector:
4 Gauge Strongly Recommended
on Ground and + 12 Volts

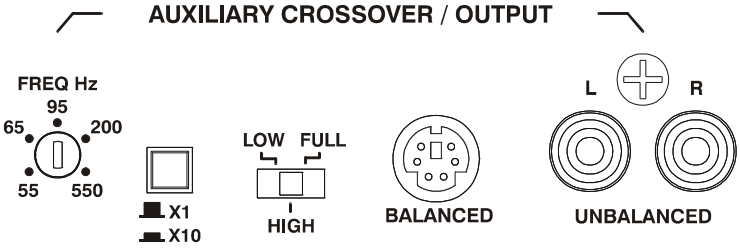
Blade Fuses: 25Amps x 3

Power On Light

Key Features

- SymbiLink™ Balanced Inputs
- RCA Unbalanced Inputs
- Two Ohm Stereo Stable
- 18 dB Variable Bass Boost Control
- Two Built in Independent Variable Electronic Crossovers
- Bridgeable
- One to Three Channel Capable
- High Current Bipolar Outputs
- Optically Isolated MOSFET Power Supply
- Selectable Auxiliary Output (Highpass / Lowpass or Fullrange)
- Quality ZAPCO Construction

Reference 750.2 Special Features



In addition to the standard Reference Series features, the 750.2 has an auxiliary crossover output. This second crossover has all the features of the internal crossover but operates on the aux output, rather than the 750.2's own amplifier. This gives the user the option of cascading crossovers in multi-amp systems and even allows band passing an amp (see the system diagram section).

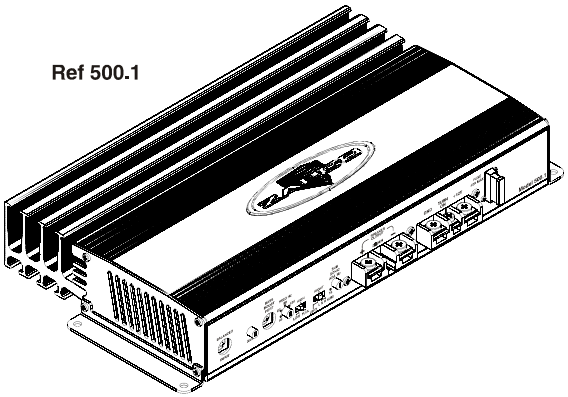
Power Requirements

The Reference Series 650.6, 750.2, 1000.4 and 1100.1 amplifiers are all extremely powerful and require special care in installation. With these large, high power amplifiers you will also want to preserve the performance and reliability of your vehicle when making modifications to your electrical system.

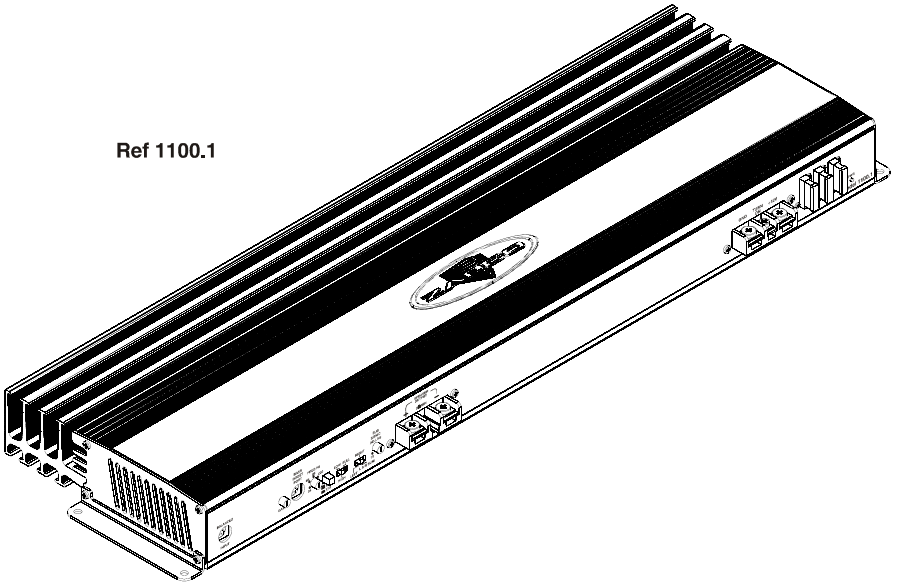
Even though the Reference Series amplifiers are very efficient, it takes a lot of current to produce a lot of power. You should follow, carefully, the minimum wire size for power and ground in the chart on page 13. Also, your high power amplifier will be the single highest current draw item in your vehicle. If you want high volume over long periods time, you should discuss electrical upgrades with your installer. You may need capacitors, extra batteries, or even an upgraded alternator. Every installation is different and the time to consider these upgrades is during the system design phase. The performance of the product is dictated by the quality of installation.

Reference Series Monaural Amplifiers

Ref 500.1



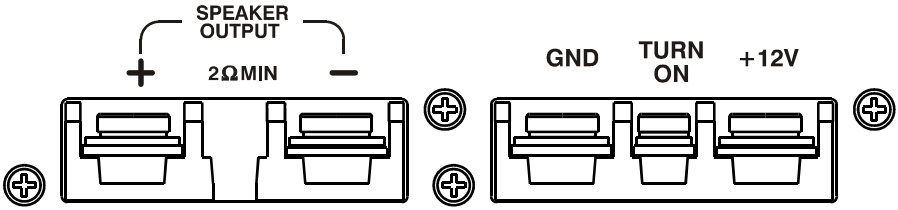
Ref 1100.1



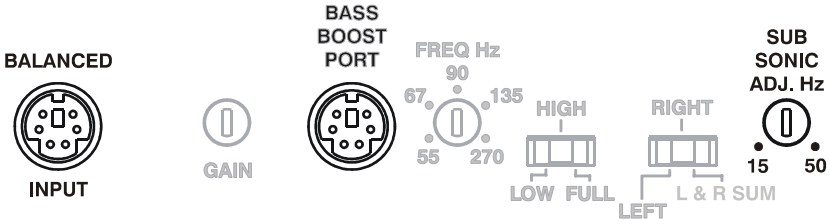
Reference Series Monaural Amp Controls

The Reference Series Mono amplifiers differ from the current Stereo and Multi-Channel units in few areas.

First, of course, is the output wiring; the 500.1 and 1100.1, are mono amplifiers, which means they only have one speaker output. Because these amplifiers will be used primarily to drive woofers, we have given them high current, heavy-duty terminal blocks.



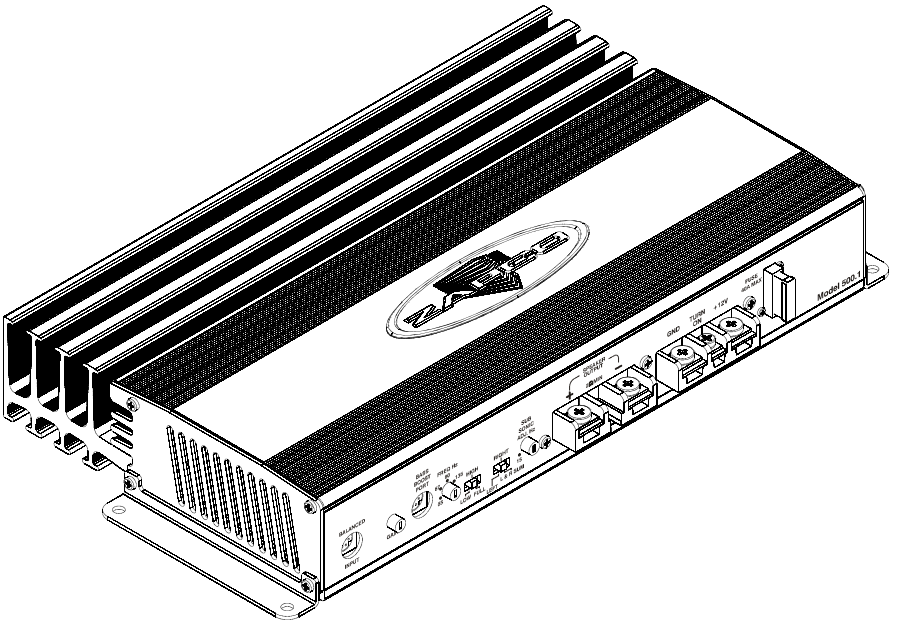
Secondly, the 500.1 and 1100.1 mono amps are the first of the Reference Series amplifiers to provide SymbiLink™ balanced line input only. You will notice that there are no RCA inputs on your 500.1 or 1100.1. ZAPCO has included the SLDIN-T.F with every amplifier. Simply plug your head unit or processor into the SLDIN-T.F and run the appropriate length SymbiLink™ cable to the DIN input of your amplifier.

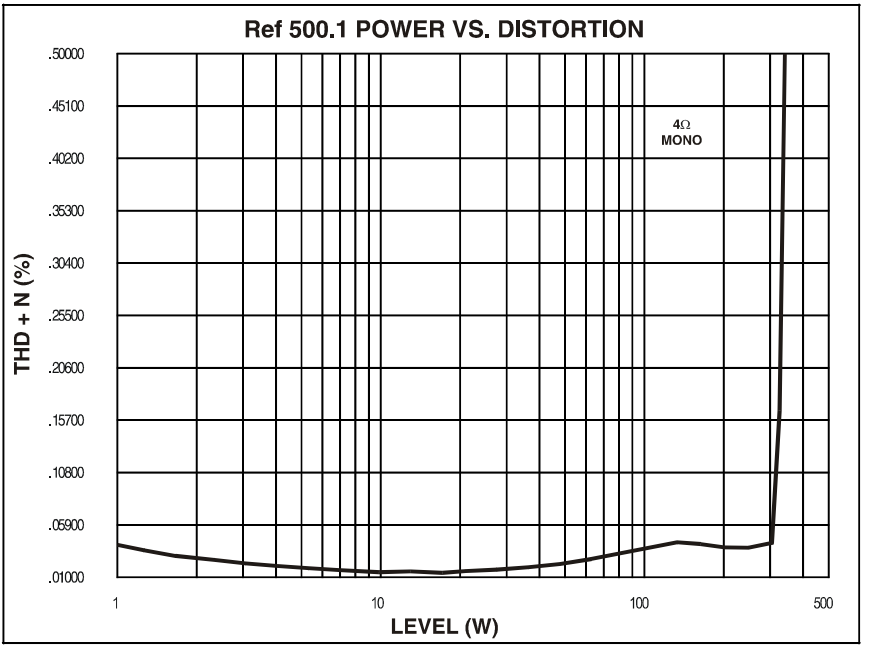


Also, the diagram above shows some control changes on the mono amps. These two models have a port for bass boost. The optional DBC (Dynamic Bass Control) can be plugged into this port for bass equalization control from the dash.

To protect your speakers, we have designed a new sub-sonic filter. The filter is a 24dB/octave, high pass that is variable from 15 Hz to 50 Hz, so you can match the filter to your woofer enclosure.

Reference 500.1

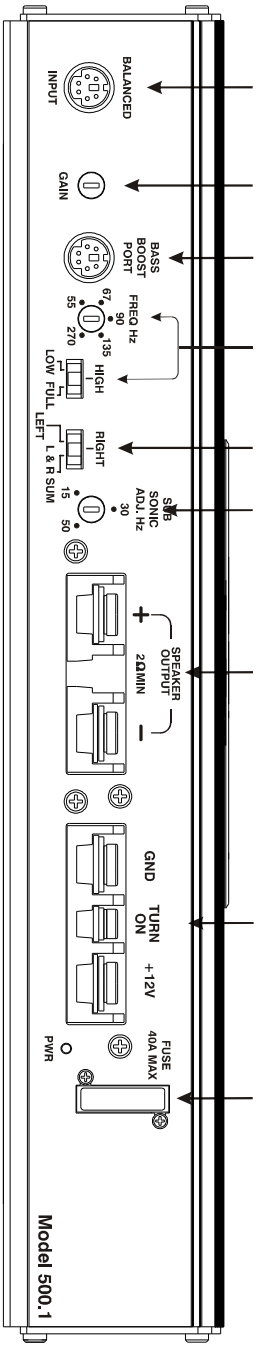




Reference 500.1 Specifications

Total Power (14.4V @ 1kHz)	
.2% T.H.D.	500 watts
Rated Power	T.H.D.+N
350 watts x 1 @ 4Ω	< .04%
500 watts x 1@ 2Ω	< .20%
Frequency Response	20 – 20kHz, +0/-.5dB
S/N Ratio	> 80dB
Transient Distortion (4Ω, 35W)	< .013%
Slew Rate	> 25 V/μS
Damping Factor	> 250 @ 4Ω
Input Sensitivity	
Balanced (DIN)	250mV – 10V
Max. Current Requirements	40 Amps @ 500 watts
Idle Current	.65 Amps
Dimensions	12”L x 7.5”W x 1.95”H

Front Panel Layout



SymbiLink Balanced Input

Gain Adjust

Bass Boost: Adjust this control for 0 to +12 dB of bass boost.

Crossover: Control and switch selects mode and frequency. See chart and specifications.

Input Mode Switch: Left Bridged, right bridged or L+R sum (Center channel or mono bass).

Variable Sub-Sonic Filter: @ 24dB/Octave

Speakers: Connect a single 4 ohm load for 350 watts output, or a single 2 ohm load for 500 watts.

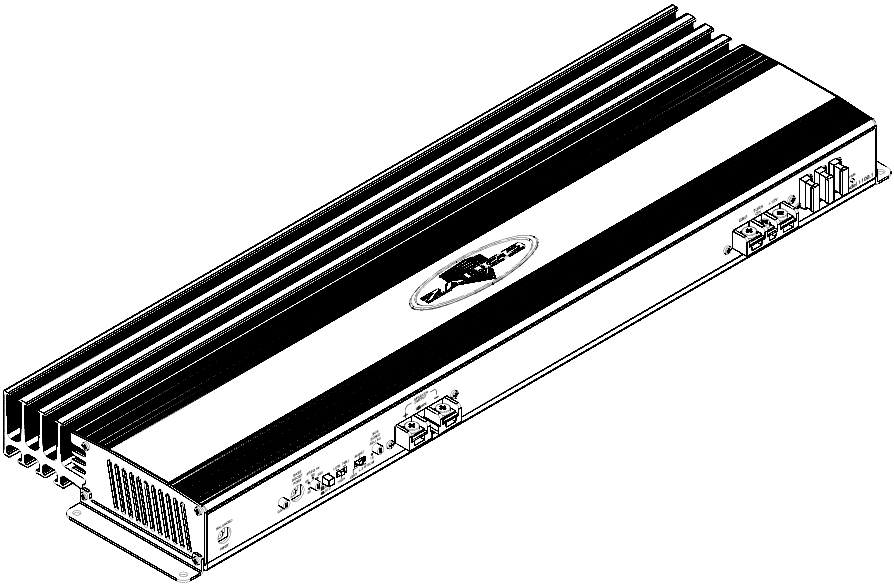
Power: Connect heavy (8 gauge min.) stranded wire to the 12 volt and ground source. Connect the ground to the auto chassis near the amplifier.

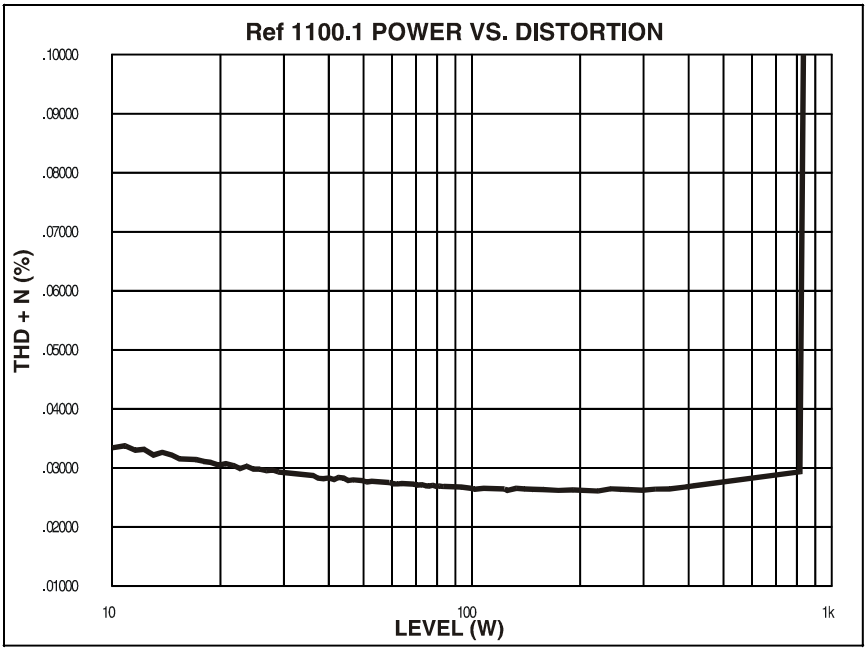
Fuse: Never replace with a fuse greater than 40 amperes.

Key Features

- Single Channel Class A/B Mono Amplifier
- SymbiLink™ Balanced Inputs
- E.H.V. High Voltage Output Circuitry
- Heavy Duty, High Current Terminals
- Compact Chassis Design
- Two Ohm Mono Stable
- Dynamic Bass Boost Port
- 12 dB Variable Bass Boost Control
- Built in Variable Electronic Crossover
- High Current Bipolar Outputs
- Optically Isolated MOSFET Power Supply
- Quality ZAPCO Construction

Reference 1100.1

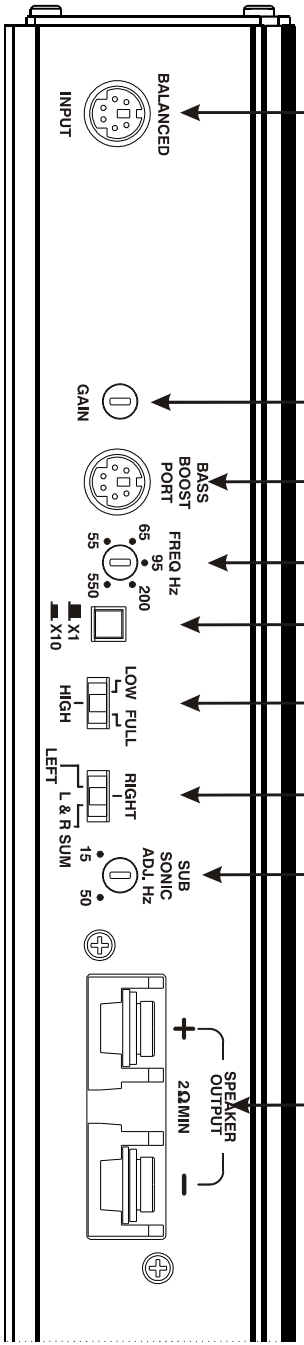




Reference 1100.1 Specifications

Total Power (14.4V @ 1kHz)	Power
Dynamic (4Ω mono)	1450 Watts
Rated Power	T.H.D.+N
825 watts x 1@ 4Ω	< .03%
1100watts x 1 @ 2Ω	< .05%
Frequency Response	20 – 20kHz, + 0 / - .5dB
S/N Ratio	> 90dB
Transient Distortion (4Ω, 40W)	< .03%
Slew Rate	40 V/µS
Damping Factor	> 700 @ 4Ω
Input Sensitivity	
Balanced (DIN)	250mV – 10V
Max. Current Requirements	135 Amps @ 900 watts
Idle Current	1.5 Amps
Dimensions	23”L x 7.5”W x 1.95”H

Front Panel Layout



SymbiLink Balanced Input

Gain Adjust

Bass Boost: Adjust this control for 0 to +12 dB of bass boost.

Crossover Freq. Adjust

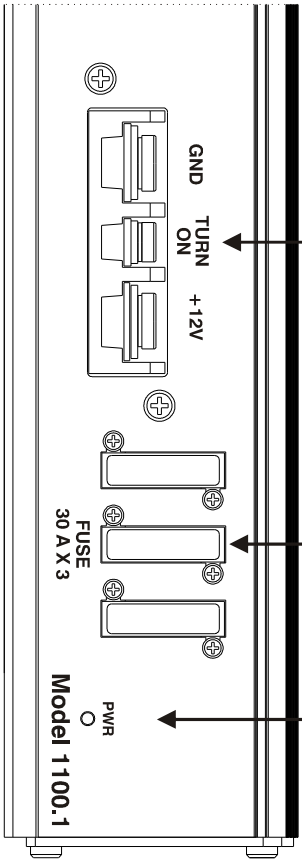
Crossover x 10 (550 - 5.5KHz)

Crossover Mode Select

Input Mode Switch

Variable Sub-Sonic Filter:
@ 24dB/Octave

Speakers:
Connect a single 4 ohm load for 800 watts output, or a single 2 ohm load for 1100 watts.



12V Power Connector:
4 Gauge Strongly Recommended
on Ground and + 12 Volts

Blade Fuses: 30Amps x 3

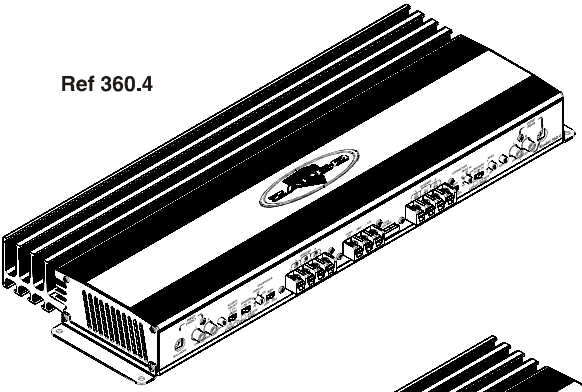
Power On Light

Key Features

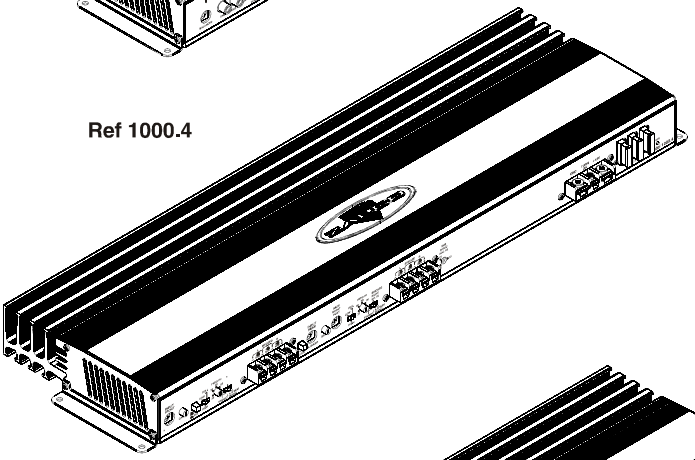
- Single Channel Class A/B Monaural Amplifier
- SymbiLink™ Balanced Inputs
- EHV High Voltage Output Circuitry
- Two Ohm Mono Stable
- Dynamic Bass Boost Port
- 12 dB Variable Bass Boost Control
- Heavy Duty, High Current Terminal Blocks
- Compact Chassis Design
- Gate Drive Boost Circuitry
- Built in Variable Electronic Crossover
- High Current Bipolar Outputs
- Optically Isolated MOSFET Power Supply
- Quality ZAPCO Construction

Reference Series Multi-Channel Amplifiers

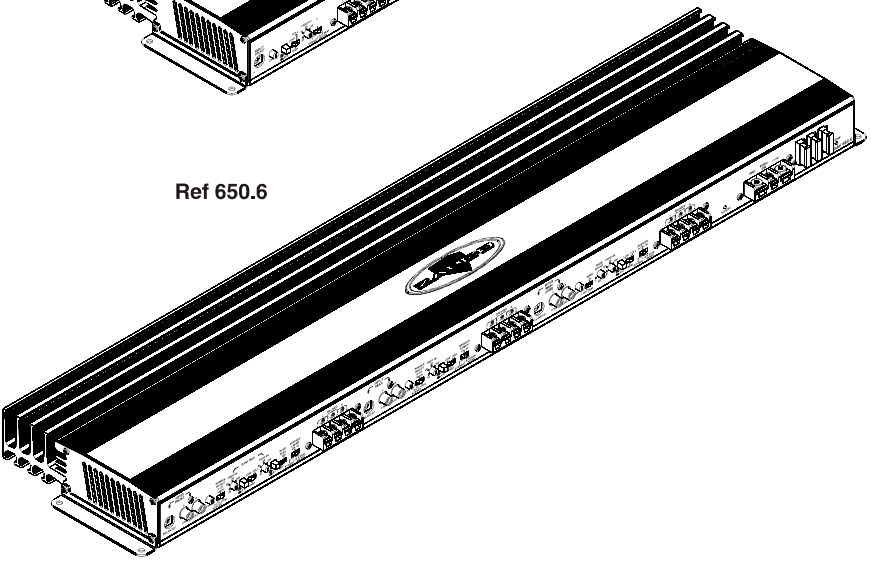
Ref 360.4



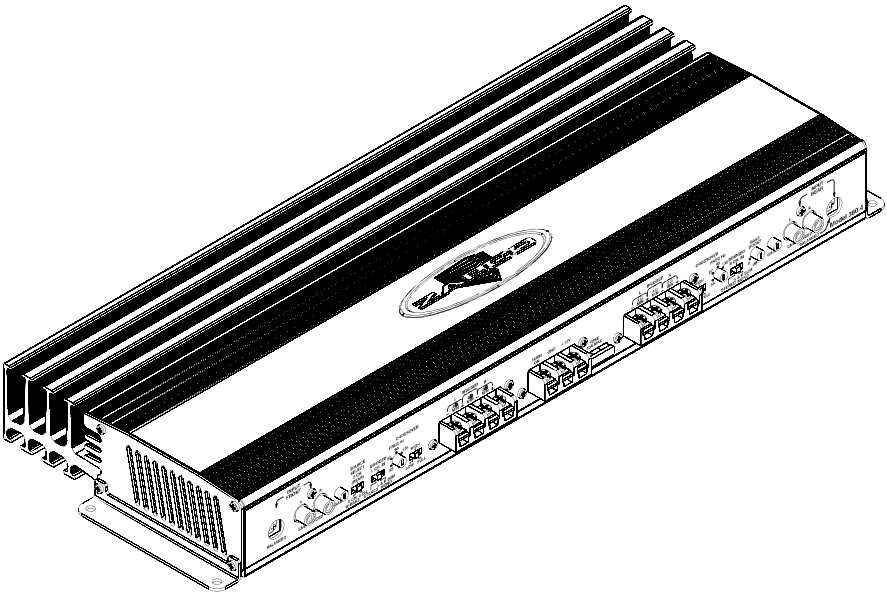
Ref 1000.4

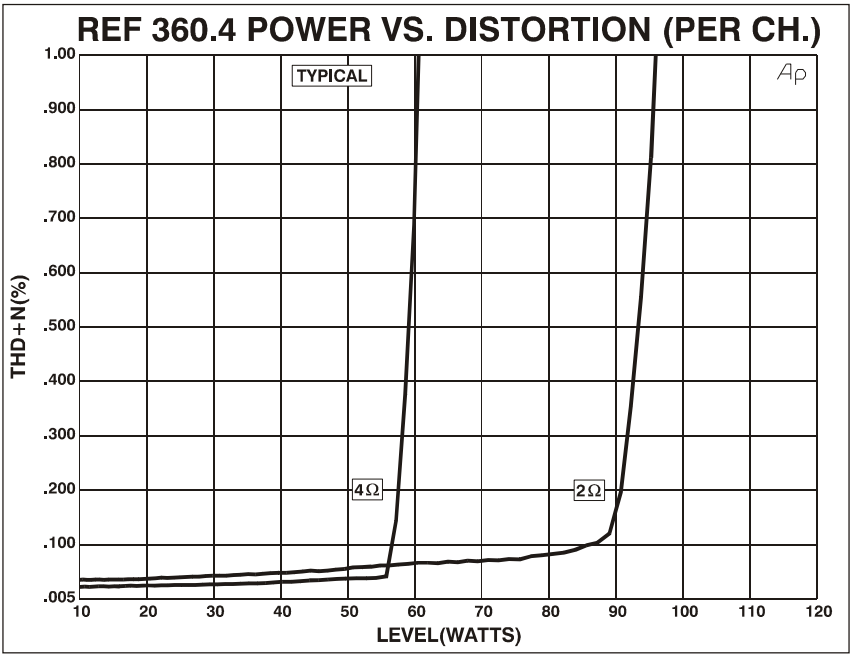


Ref 650.6



Reference 360.4

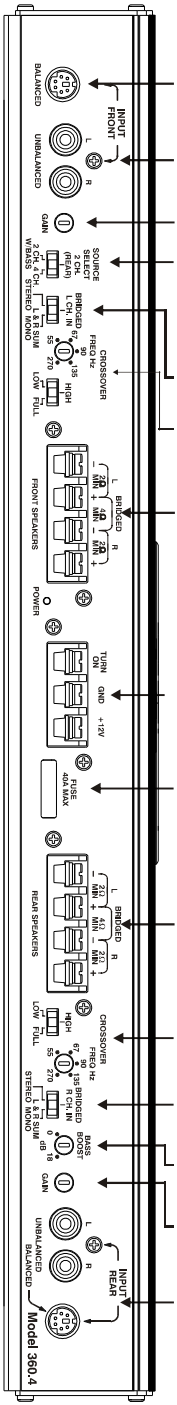




Reference 360.4 Specifications

Total Power (14.4V @ 1kHz)	Power
Dynamic (4Ω mono)	395 watts
.2% T.H.D.	365 watts
Rated Power / Channel	T.H.D.+N
50 watts x 4 @ 4Ω	< .046%
90 watts x 4 @ 2Ω	< .13%
Bridged Mono	
110 watts x 2 @ 8Ω	< .05%
180 watts x 2 @ 4Ω	< .1%
Frequency Response	20 – 20kHz, ± .12dB
S/N Ratio	> 95dB
Transient Distortion (4Ω, 40W)	< .01%
Slew Rate	> 23 V/μS
Damping Factor	> 160 @ 4Ω
Input Sensitivity	
Balanced (DIN)	500mV – 10V
Unbalanced (RCA)	250mV – 5V
Separation	> 55Db Front, 58dB Rear
Max. Current Requirements	45 Amps @ 365 watts
Idle Current	1.1 Amps
Dimensions	18”L x 7.5”W x 1.95”H

Front Panel Layout



Front Channel SymbiLink Balanced Input

Unbalanced RCA Inputs

Gain Adjust

Source Select:
Left Position: Source is rear stereo input, includes bass boost circuit.
Middle Position: Source is rear input, the bass boost circuit is included.
Right Position: Normal 4 channel mode.

Front Mode: Selects stereo, bridged or L+R sum (center channel or mono bass.)

Front Crossover: Control and switch sets the mode and frequency.

Front Speakers:
Connect a single 4 ohm load across the center contacts for 180 watts bridged output.

Power: Connect heavy (8 gauge min.) stranded wire to the 12 volt and ground source. Connect the ground to the auto chassis near the amplifier.

Fuse: Never replace with a fuse greater than 40 amperes.

Rear Speakers:
Connect a single 4 ohm load across the center contacts for 180 watts bridged output.

Rear Crossover: Control and switch selects mode and frequency.

Rear Mode: Selects stereo, bridged right or L+R sum (center channel or mono bass.)

Rear Bass: Adjusts bass equalization from 0 to +18 dB (See "Bass Equalization" graph.)

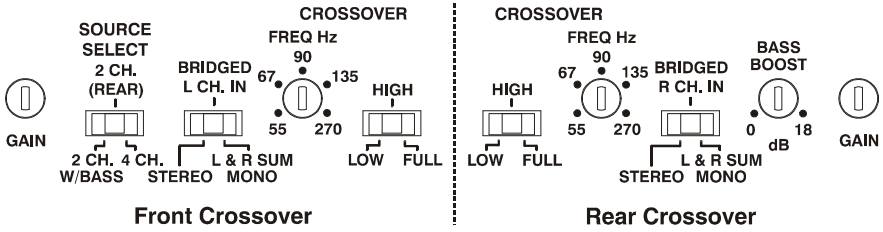
Rear Gain: Adjusts the input sensitivity from .5 to 5 volts (.25-2.5v unbalanced)

Rear Inputs: Connect balanced SymbiLink or unbalanced RCA inputs. (Never both)

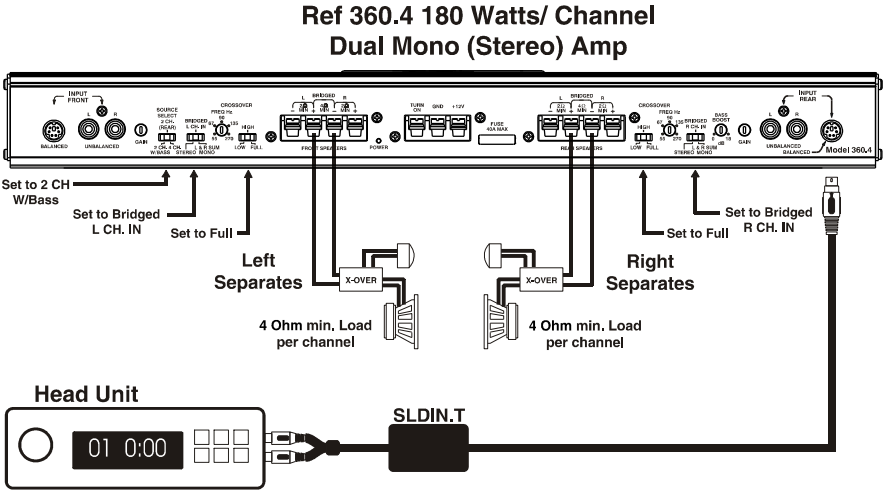
Key Features

- SymbiLink™ Balanced Inputs
- RCA Unbalanced Inputs
- Two Ohm Stereo Stable
- 18 dB Variable Bass Boost Control
- Built in Variable Electronic Crossover
- Dual Bridgeable @ 4 ohm
- Four Channel
- High Current Bipolar Outputs
- Optically Isolated MOSFET Power Supply
- Quality ZAPCO Construction

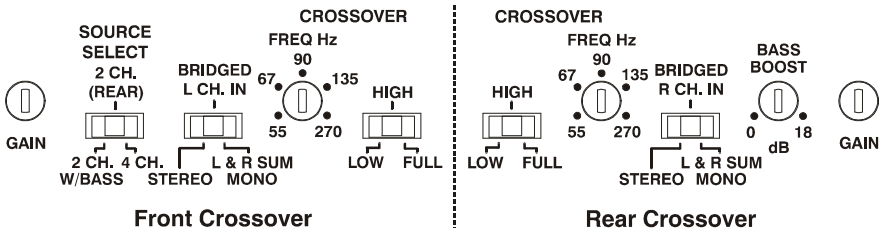
Reference 360.4 Special Features



The 360.4 is the Reference Series smaller 4 channel amplifier. Like the other Reference Series amps, it has a full-featured electronic crossover. The 360.4, however, has two crossovers. They vary slightly from standard, however at the signal mode switch. While other reference amps bridge to the right channel, the 360.4 bridges the front channels to left and rear channels to right. This allows you to switch the 360.4 for “Dual Mono” use. You now have a stereo amp with 180 Watts RMS per channel.

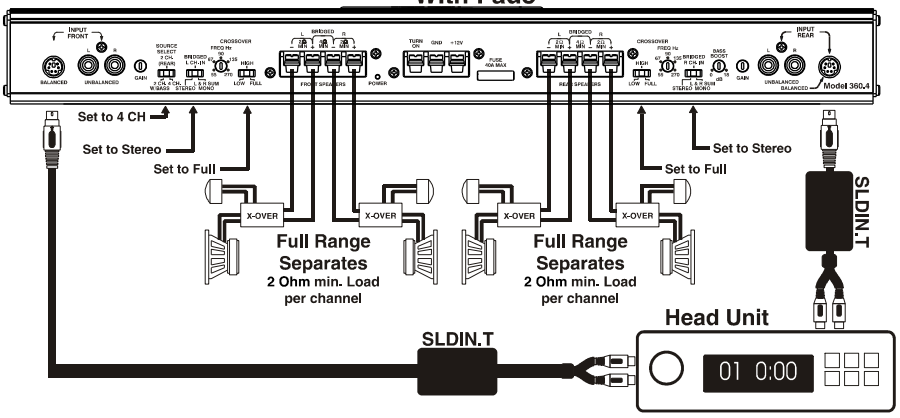


Reference 360.4 Special Features

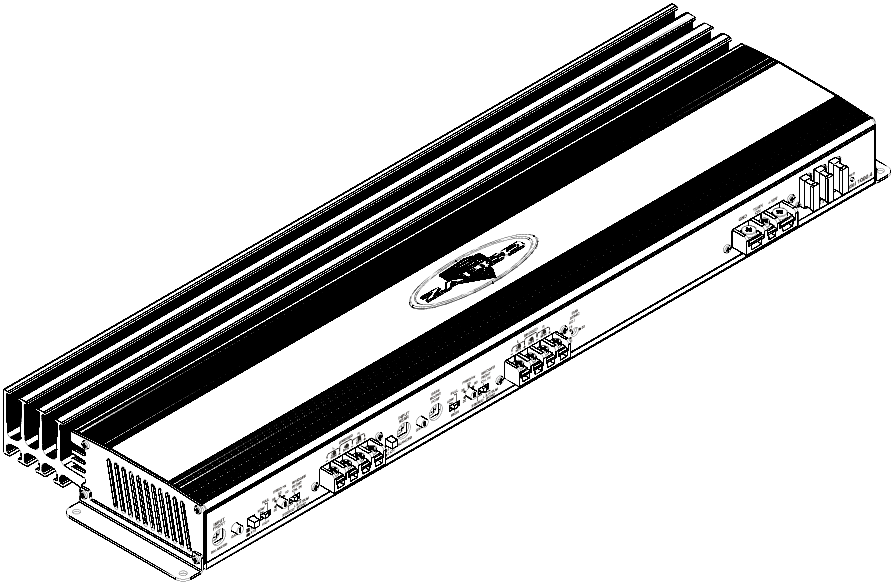


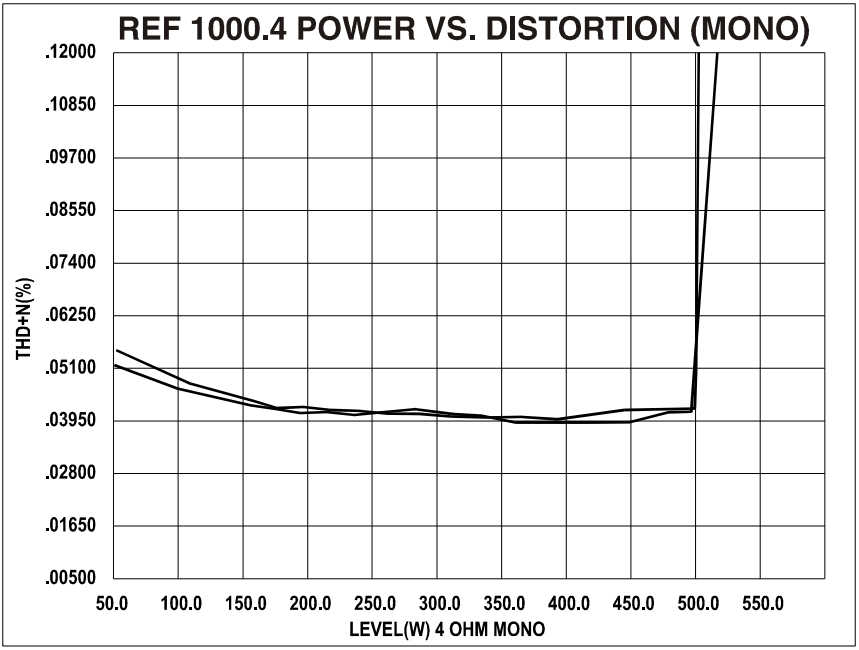
Another difference is the SOURCE SELECT switch. The 4 CH position is used if you will have separate front and rear channel inputs. This is necessary if you wish to fade between front and rear. The 2 CH mode allows the front inputs to pick up their signal from the rear inputs. This lets you run the entire amp on only one set of input cables. This is very useful when running the 360.4 in 3 channel mode or when using it as a stereo amp. The 2 CH w/BASS mode is similar to 2 CH except that the rear input's bass boost circuit will affect the front input as well.

Ref 360.4 Basic 4 Channel With Fade



Reference 1000.4

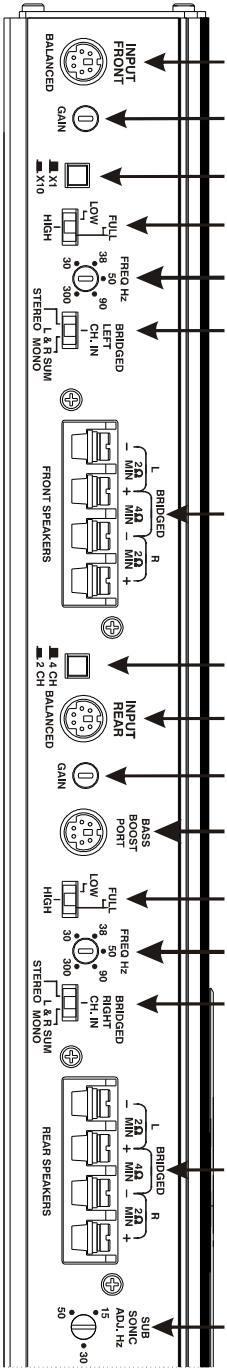




Reference 1000.4 Specifications

Total Power (14.4V @ 1kHz)	Power
Dynamic (4Ω mono)	1200 watts
Rated Power / Channel	T.H.D.+N
150 watts x 4 @ 4Ω	< .04%
250 watts x 4 @ 2Ω	< .05%
Bridged to Dual Mono	
500 watts x 2 @ 4Ω	< .04%
Frequency Response	20 – 20kHz, + 0 / - .5dB
S/N Ratio	> 90dB
Transient Distortion (4Ω, 40W)	< .03%
Slew Rate	> 36 V/μS
Damping Factor	> 300 @ 4Ω
Input Sensitivity	
Balanced (DIN)	560mV – 10V
Unbalanced (RCA)	260mV – 5V
Separation	> 60dB
Max. Current Requirements	120 Amps @ 1000 watts
Idle Current	1.56 Amps
Dimensions	23”L x 7.5”W x 1.95”H

Front Panel Layout



Front SymbiLink Balanced Input

Front Gain Adjust

Crossover x 10 (300 - 3KHz)

Front Crossover Mode Select

Front Crossover Freq. Adjust

Front Input Mode Switch

Front Speakers:
Connect a single 4 ohm load for 150 watts output, or a single 2 ohm load for 250 watts.

Selects from Front or Rear Inputs

Rear SymbiLink Balanced Input

Rear Gain Adjust

Bass Boost: Adjust this control for 0 to +12 dB of bass boost.

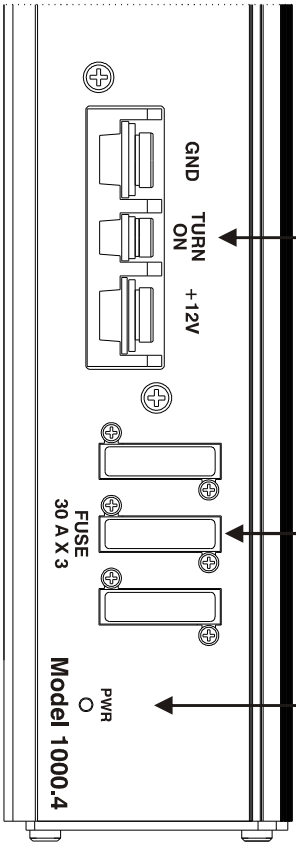
Rear Crossover Mode Select

Rear Crossover Freq. Adjust

Rear Input Mode Switch

Rear Speakers:
Connect a single 4 ohm load for 150 watts output, or a single 2 ohm load for 250 watts.

Variable Sub-Sonic Filter:
@ 24dB/Octave



12V Power Connector:
4 Gauge Strongly Recommended on Ground and + 12 Volts

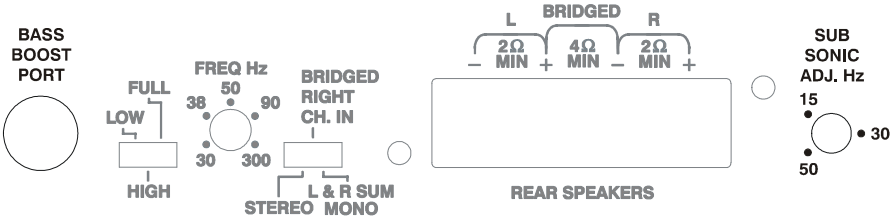
Blade Fuses: 30Amps x 3

Power On Light

Key Features

- SymbiLink™ Balanced Inputs
- Dynamic Bass Boost Port
- 12 dB Variable Bass Boost Control
- Two Variable Electronic Crossovers
- Dual Bridgeable @ 4 Ohms
- Variable Electronic Sub-Sonic Filter
- ZAPCO EHVC Output Circuitry
- Optically Isolated MOSFET Power Supply
- 2 Channel, 3 Channel, or 4 Channel Operation
- 2 Channel or 4 Channel Input Selection
- Heavy Duty, High Current Terminal Blocks
- Gate Drive Boost Circuitry
- Quality ZAPCO Construction

1000.4 Special Features

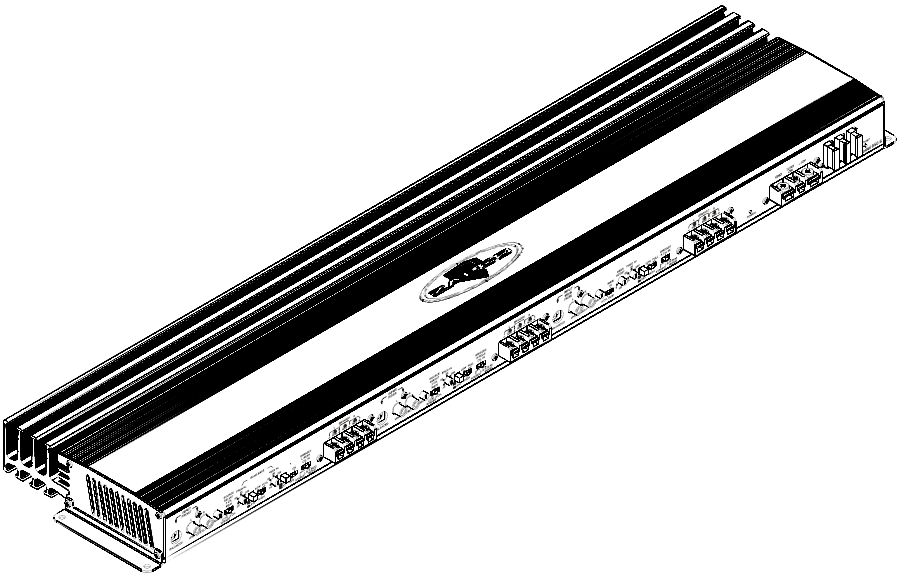


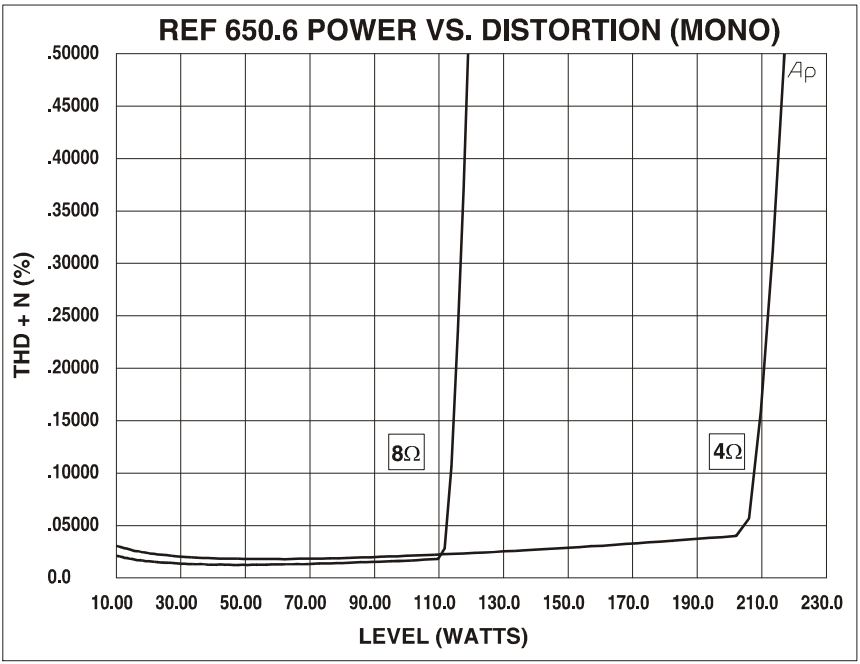
There are a couple of features unique to the 1000.4, 500.1 and 1100.1 amps in the Reference line.

First, the 1000.4 has a Bass Boost port for the 45Hz bass equalizer circuit. An optional DBC (Dynamic Bass Control) can be plugged into the Bass Boost Port to give the listener up to a 12dB Bass Boost adjustment.

Secondly, the Sub-Sonic filter of these units is variable to allow proper tuning of the car and the enclosure. Ported enclosures can easily double the acoustic output of a sub woofer at the port tune frequency. However these enclosures greatly decrease the ability for a woofer to handle power below the port operating range. The variable Sub-Sonic filter allows the installer to get maximum volume at the best port frequency for the individual installation, and filter out the frequencies below that, to protect the woofer from being over-driven.

Reference 650.6

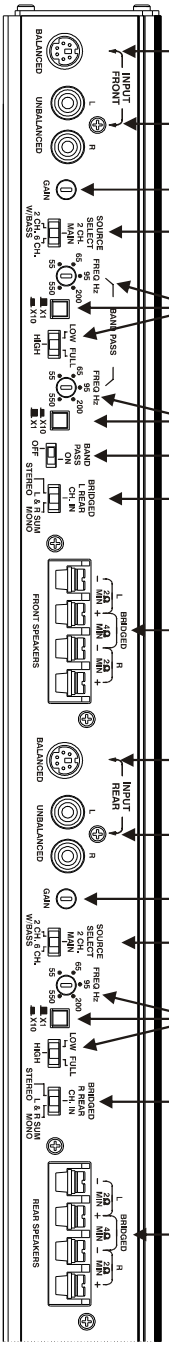




Reference 650.6 Specifications

Total Power (14.4V @ 1kHz)	Power
Dynamic (4Ω mono)	540 watts
Rated Power / Channel	T.H.D.+N
50 watts x 6 @ 4Ω	< .05%
104 watts x 6 @ 2Ω	.2%
Max Power	
90 watts x 4 @ 2Ω 175 watts x 2 @ 1Ω	.2%
Frequency Response	20 – 20kHz, + 0 / - .5dB
S/N Ratio	> 95dB
Transient Distortion (4Ω, 40W)	< .02%
Slew Rate	> 23 V/µS
Damping Factor	> 160 @ 4Ω
Input Sensitivity	
Balanced (DIN)	500mV – 10V
Unbalanced (RCA)	250mV – 5V
Separation	> 60dB
Max. Current Requirements	80 Amps @ 540 watts
Idle Current	1.72 Amps
Dimensions	31”L x 7.5”W x 1.95”H

Front Panel Layout



Front Channel SymbiLink Balanced Input

Front Channel Unbalanced RCA Inputs

Front Gain Adjustment

Front Source Select:
- Left Position: 2 Channel with Bass Boost - Main Input
- Center Position: 2 Channel - Main Input
- Right Position: 6 Channel - Front Input

Front Crossover: 55 - 5500 Hertz

Lowpass Crossover: Used in Band Pass Mode. Front Channel Only.

Band Pass On/Off Switch

Front Output Configuration Switch: Stereo, Bridged, or Left and right Sum

Front Speaker: 2 Ohm Stereo (4 Ohm Mono) Minimum.

Rear Channel SymbiLink Balanced Input

Rear Channel Unbalanced RCA Inputs

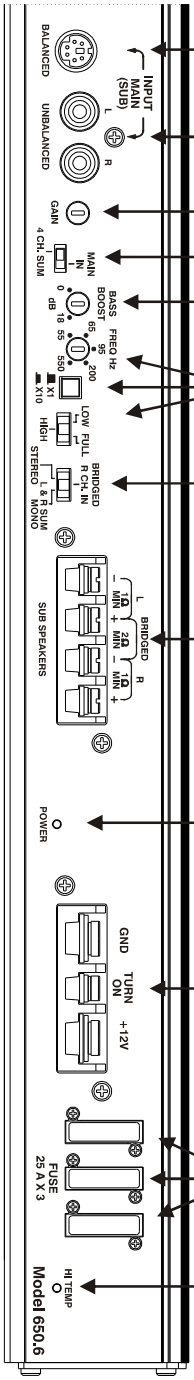
Rear Gain Adjustment

Rear Source Select :
- Left Position: 2 Channel with Bass Boost - Main Input
- Center Position: 2 Channel - Main Input
- Right Position: 6 Channel - Rear Input

Rear Crossover: 55 - 5500 Hertz

Rear Output Configuration Switch: Stereo, Bridged, or Left and right Sum

Rear Speaker: 2 Ohm Stereo (4 Ohm Mono) Minimum.



Main Symbilink™ Balanced Input

Main Unbalanced RCA Inputs

Sub Gain Adjustment

Sub Signal Source: Main or Front and Rear Sum

Bass Boost (0 to 18dB Gain)

Sub Crossover: 55 - 5500 Hertz

Sub Output Configuration Switch:
Stereo, Bridged, or Left and right Sum

Sub Speaker: 1 Ohm Stereo (2 Ohm Mono) Minimum

Power on Light

12V Power Connector
4 Gauge Recommended (8 Gauge Minimum)

Blade Fuses: 25 Amps x 3

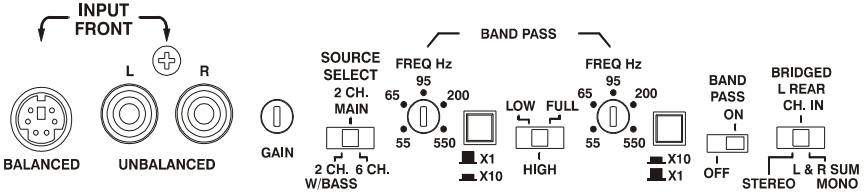
High Temperature Light: Approximately 78° C

Key Features

- SymbiLink™ Balanced Inputs
- RCA Unbalanced Inputs
- Two Ohm Stereo Stable, One Ohm Stereo on Sub Channels
- 18 dB Variable Bass Boost Control
- Built in Variable Electronic Crossover
- Bridgeable
- Three to Six Channel Capable
- High Current Bipolar Outputs
- Optically Isolated MOSFET Power Supply
- Quality ZAPCO Construction

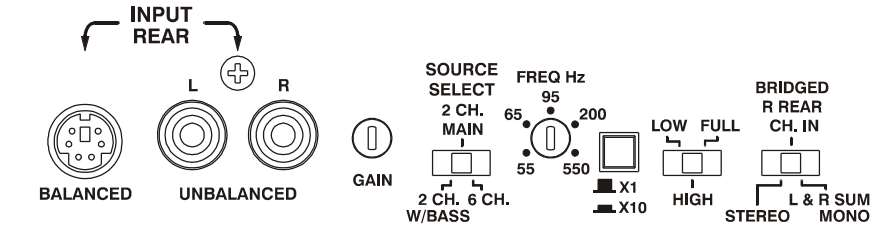
Reference 650.6 Special Features

The Reference 650.6 is a six-channel amp, which ZAPCO has designed to function as a full and complete high-end stereo system in a single chassis. At first glance, the controls that allow so many functions from a single amp can be a little daunting. Therefore, we will look at the controls in three sections. Channels 1 / 2 (front), Channels 3 / 4 (rear), and the Bass Channels 5 / 6.

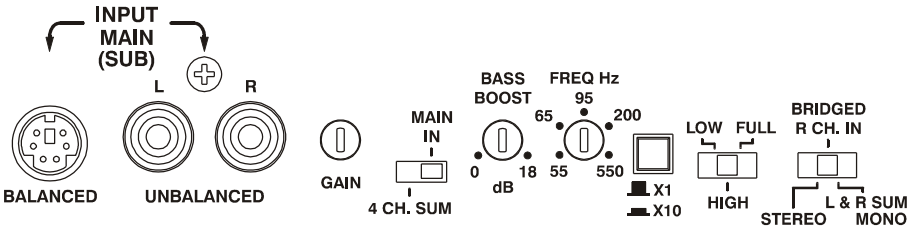


The controls on the far left operate channels 1 and 2. The first unique function to set is the Source Select. You have the option, with the 650.6, of using a single (2 CH) input for the entire system (Main/Bass input), or using separate inputs for each section (6 CH.). You may also use just the front and rear inputs, and let the bass amp automatically grab all the bass information from the other channels (2 CH w/Bass). See the system diagram section for examples.

This section of the 650.6 has two separate crossovers available. The two crossovers allow channels 1 / 2 to be used in a band pass configuration as well as high pass, low pass, or full range. The first three X/O controls will be used for normal crossover setups as described in the controls section (page 19). The next two controls come into play only if you set the BAND PASS control to ON. When you do that, the next two controls set the top end (low pass) of your band pass crossover. For example: You set the left hand FREQ Hz to 85 Hz and X1 and High, then you set the right hand FREQ Hz to 200Hz and X1 and switch the BAND PASS to ON. Now the high pass gives everything over 85Hz and the low pass gives everything under 200Hz. You now have a “band” of frequencies from 85Hz to 200Hz. This allows the 650.6 to send a “band” of frequencies to a mid-range or mid-bass, in a three-way or four-way system.



The center section of the Reference 650.6 controls channels 3 / 4. This differs from 1 / 2 in that you have only one crossover section, since channels 3 / 4 are not used for band pass. You will still need to set the SOURCE SELECT, just as you do for 1 / 2, and you still have the Mode switch (see page 17). Note the difference, however: on CH 1 / 2 the Mode switch bridges to the left channel, on 3 / 4 it bridges to the right channel. This allows the 650.6 to be used as a three channel amp…150 watts Left, 150 watts Right, and 350 watts Bass (see system diagrams).

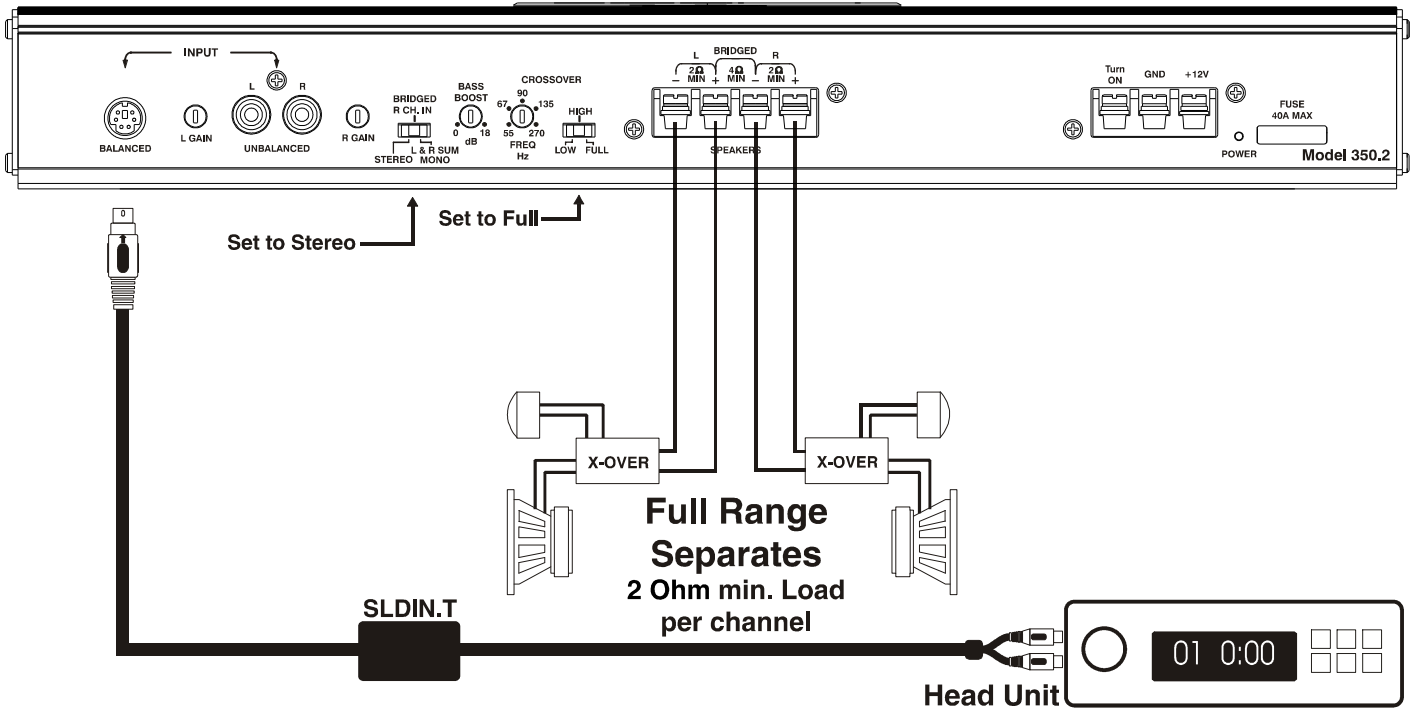


The right hand section of the 650.6 controls channels 5 / 6. There are two notable differences in this section of the 650.6. First, the SOURCE SELECT has only two positions; MAIN IN or 4 CH SUM. In 4 Ch. Sum, channels 5 / 6 pull a mono signal summed from the other 4 channels. This gives a constant bass regardless of how the other channels are faded. Second, this is the only section of the 650.6 that has the ZAPCO Bass EQ control. Channels 5 / 6 have the full function ZAPCO switchable crossover, but the bottom line here is sub woofer power. This section of the Reference 650.6 can put out 350 watts into a 2-ohm mono load.

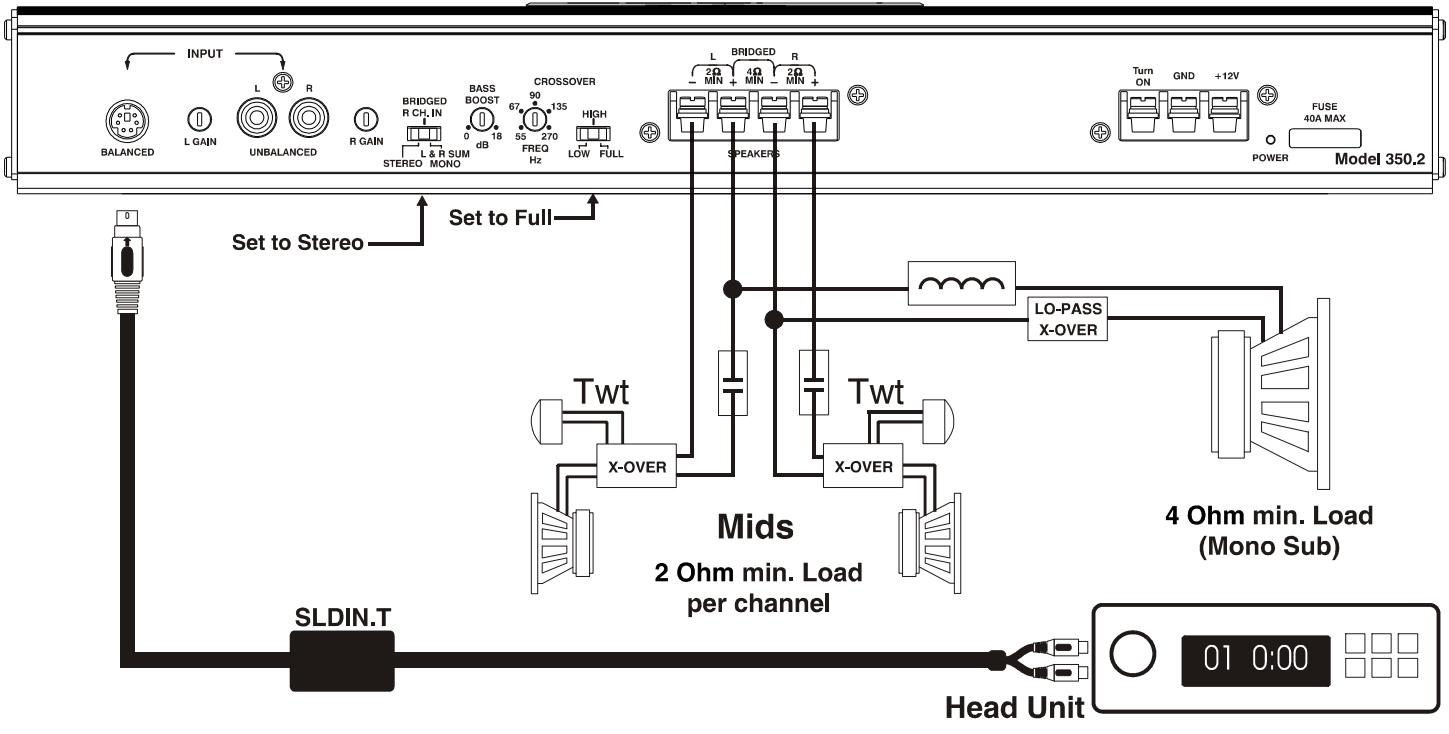
System Diagrams

Reference 200.2 / 350.2	**Page 68 - 71**
Reference 360.4	**Page 73 - 78, 82**
Reference 750.2	**Page 79 - 81, 83, 84**
Reference 650.6	**Page 86 - 91**
Reference 500.1	**Page 72, 78**
Reference 1000.4	**Page 85**
Reference 1100.1	**Page 81 - 84**

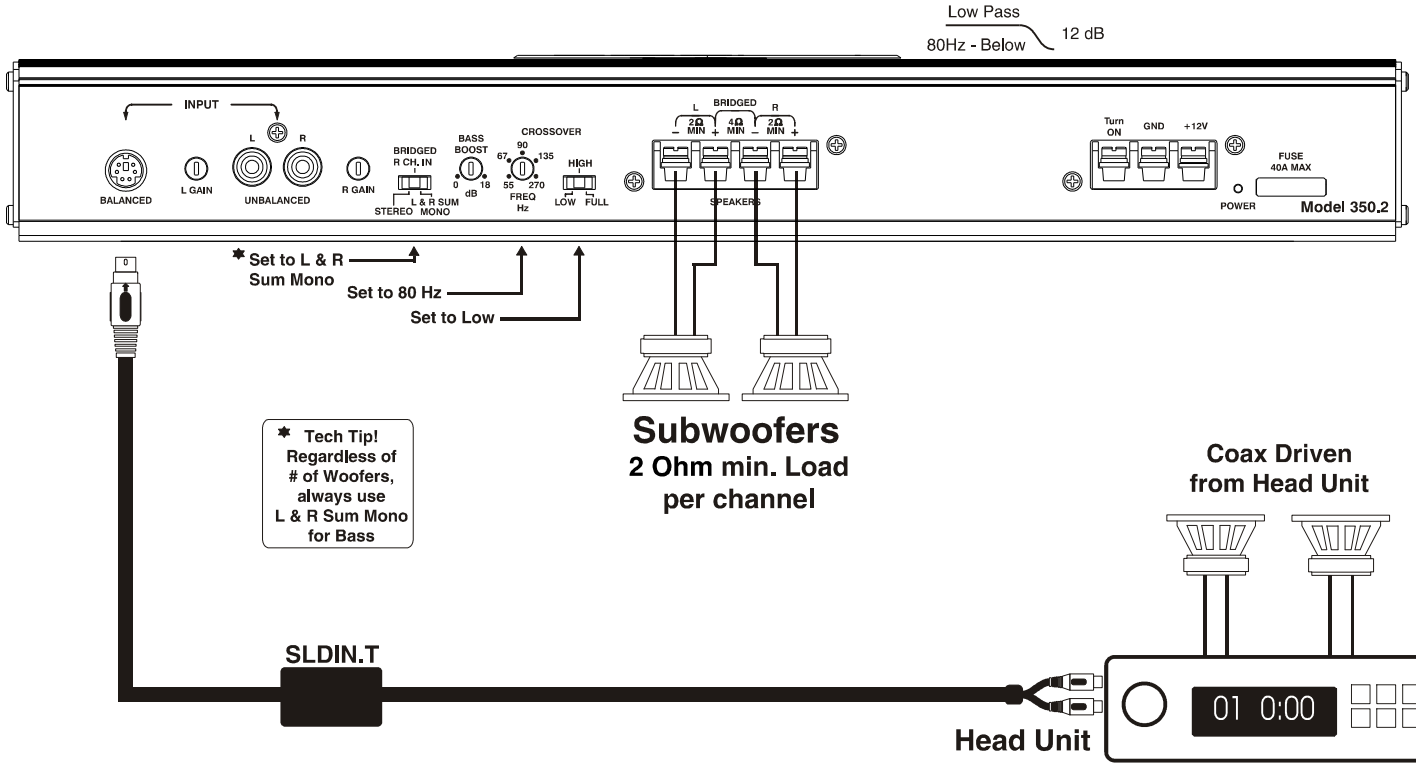
Basic Full Range System for Ref 200/350



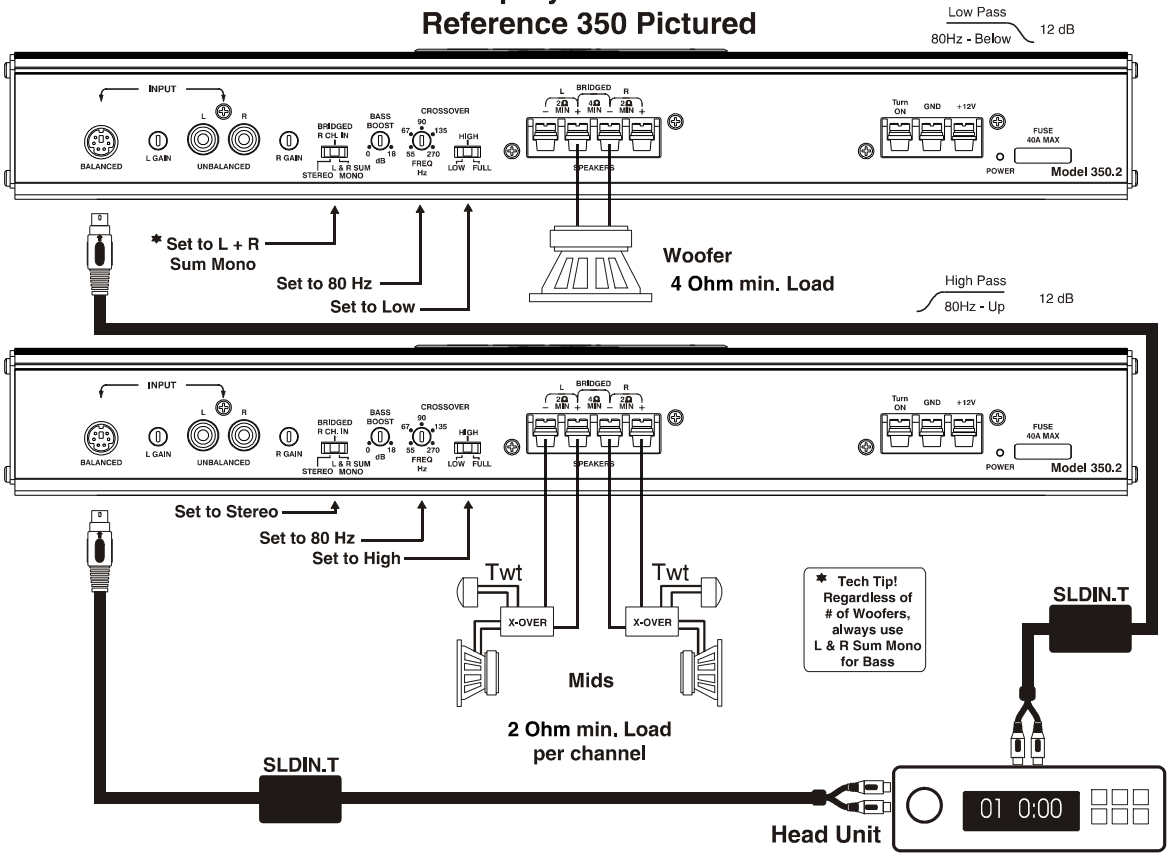
Basic 3 Channel System w/ Subwoofer for Ref 200/350
Reference 350 Pictured



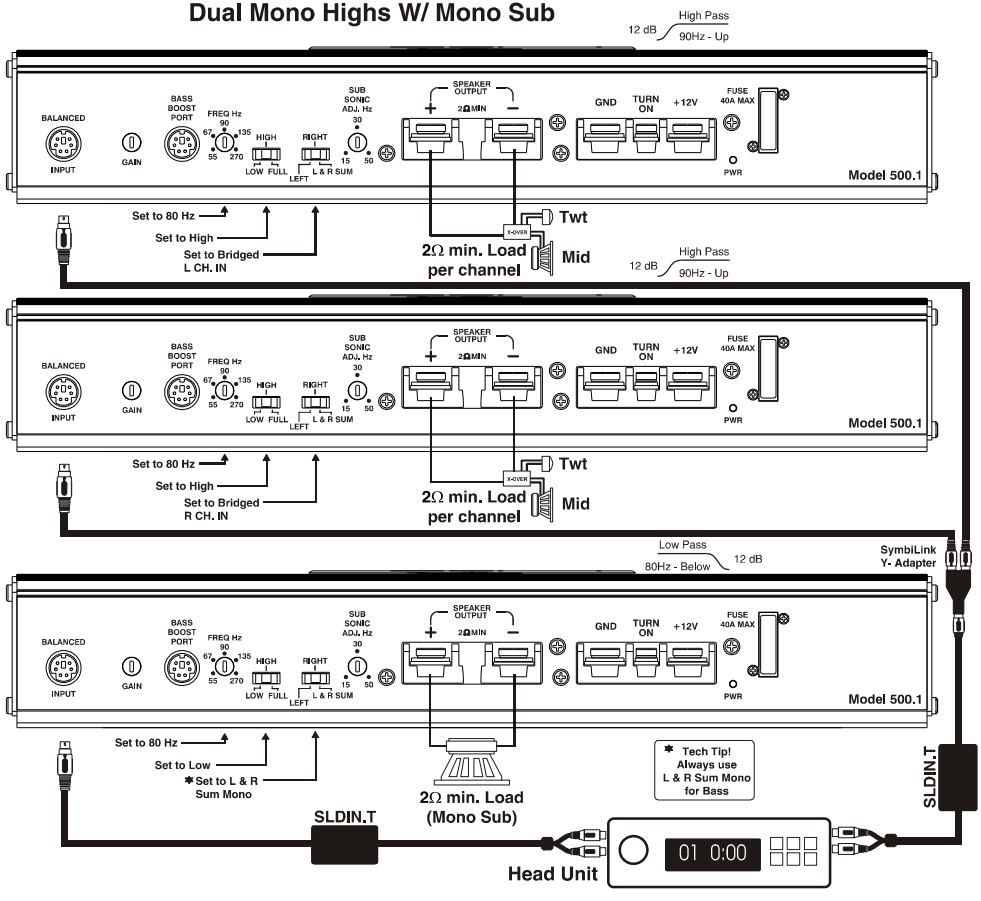
Basic Install adding Bass for System for Ref 200/350
Reference 350 Pictured



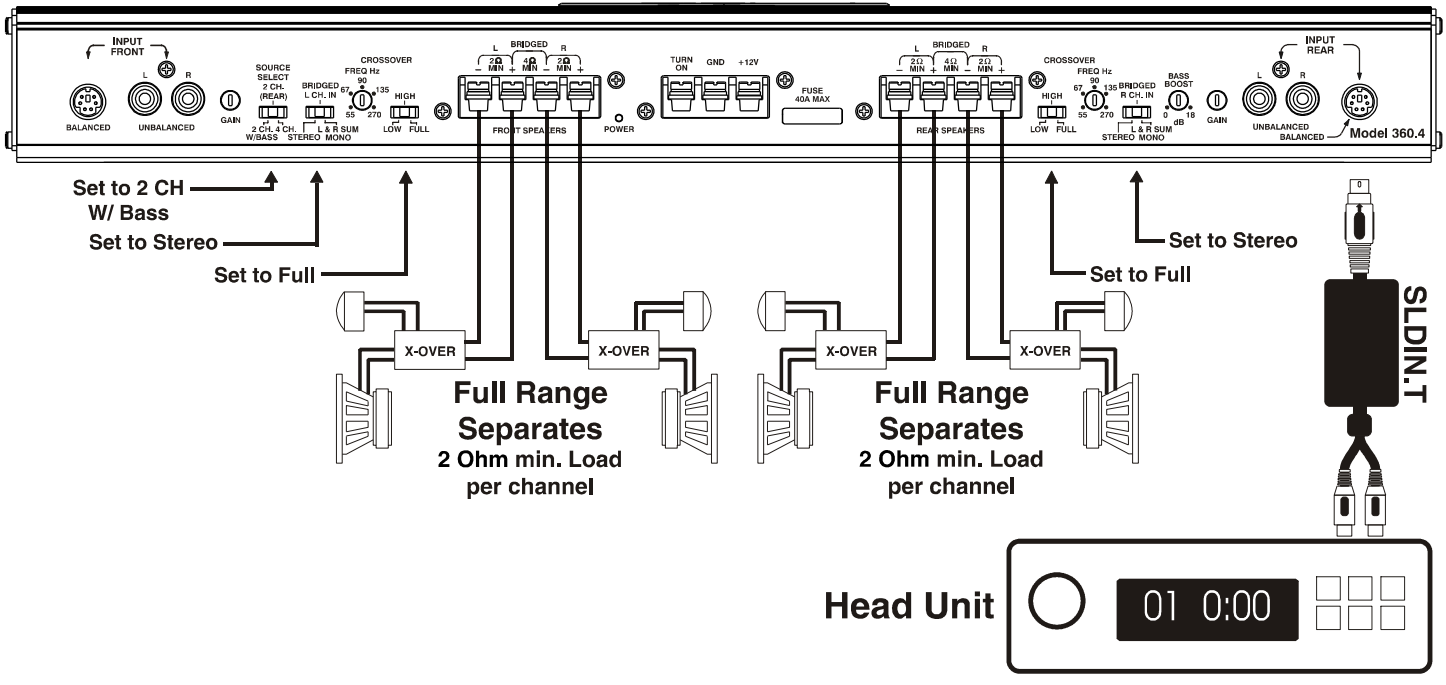
Basic Bi-Amp System for Ref 200/350
Reference 350 Pictured



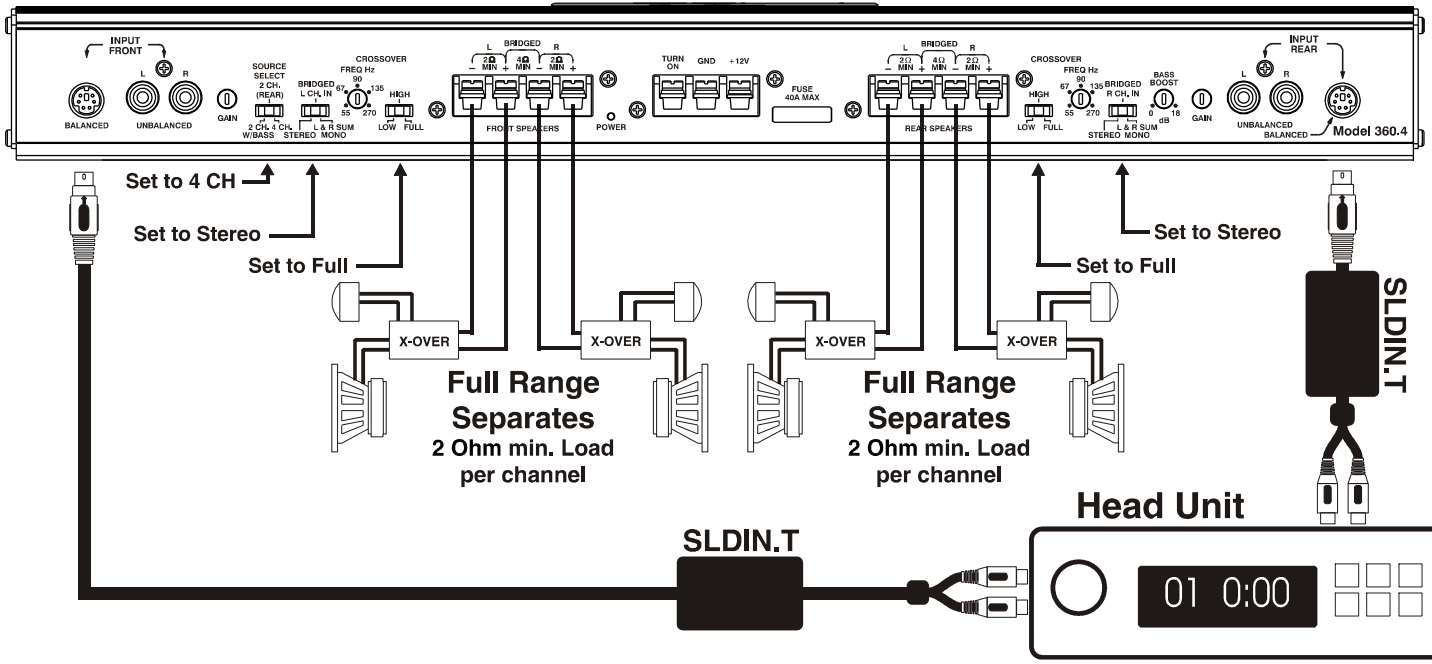
Dual Mono Highs W/ Mono Sub



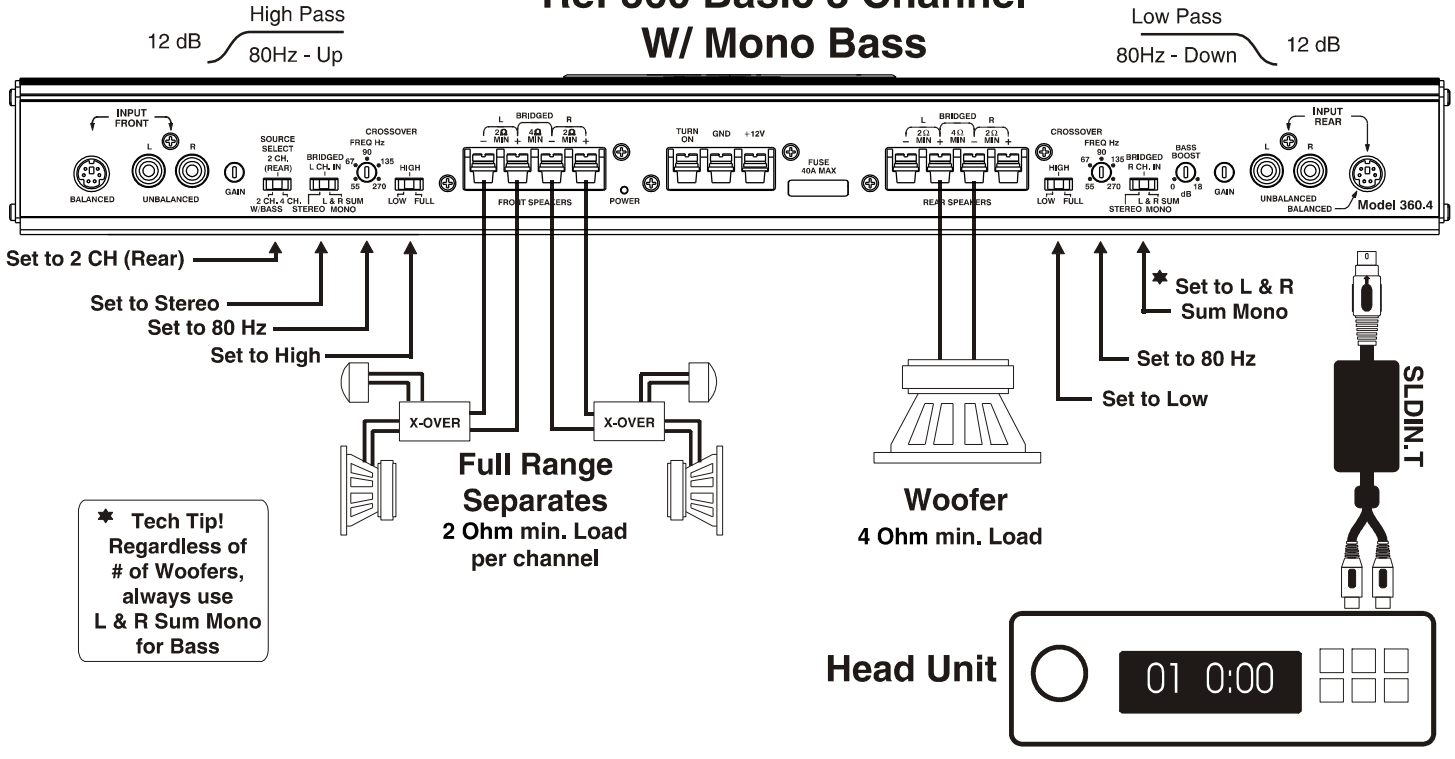
Ref 360 Basic 4 Channel
No Fade



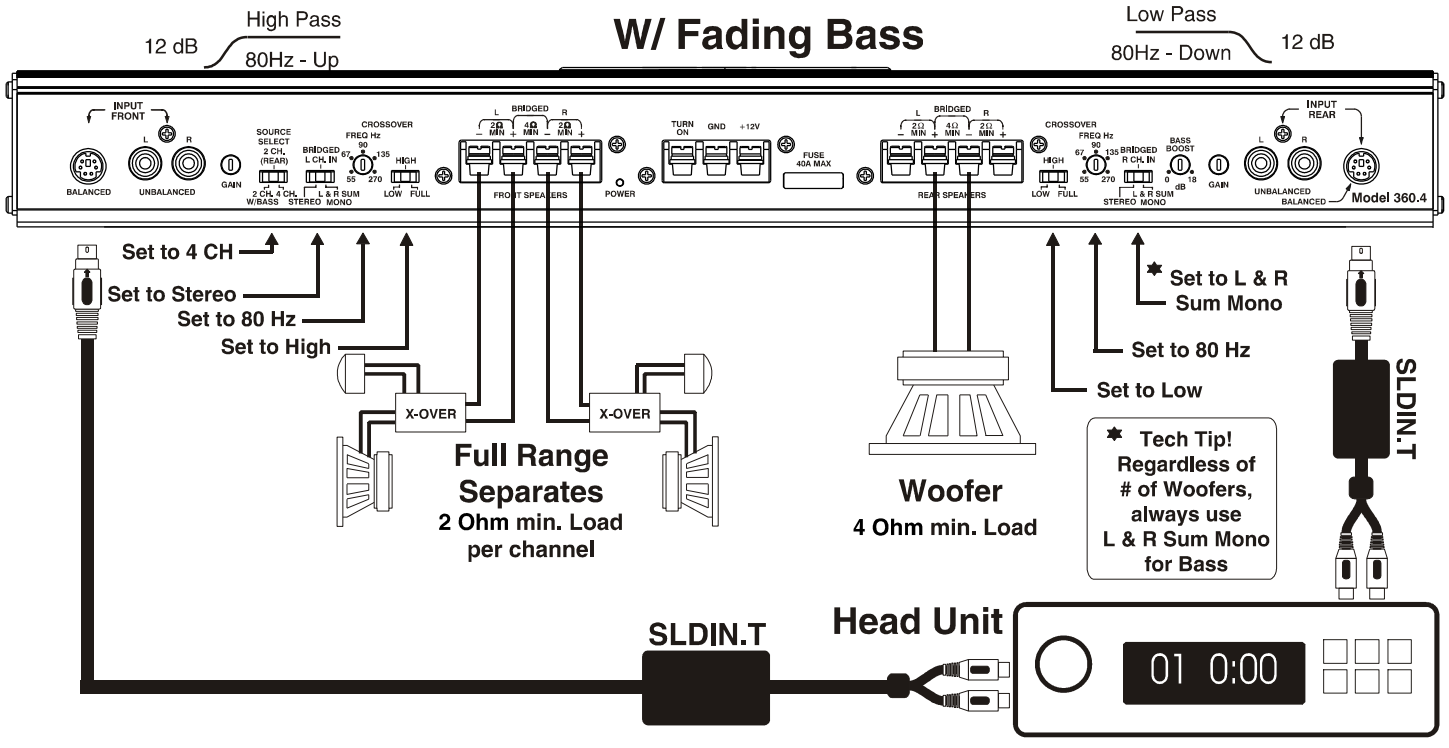
Ref 360.4 Basic 4 Channel With Fade



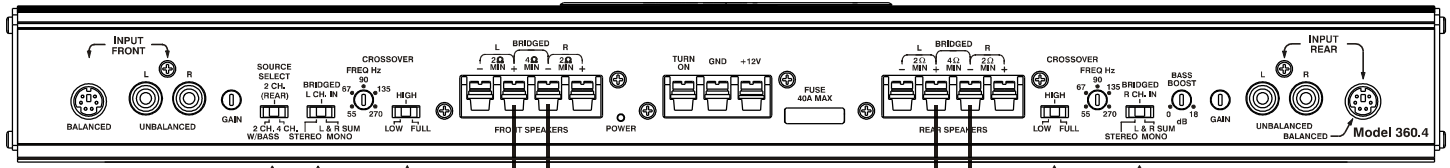
Ref 360 Basic 3 Channel W/ Mono Bass



Ref 360 3 Channel W/ Fading Bass



Ref 360.4 180 Watts/ Channel
Dual Mono (Stereo) Amp



Set to 2 CH W/Bass

Set to Bridged L CH. IN

Set to Full

Left Separates

X-OVER

4 Ohm min. Load per channel

X-OVER

4 Ohm min. Load per channel

Right Separates

Set to Full

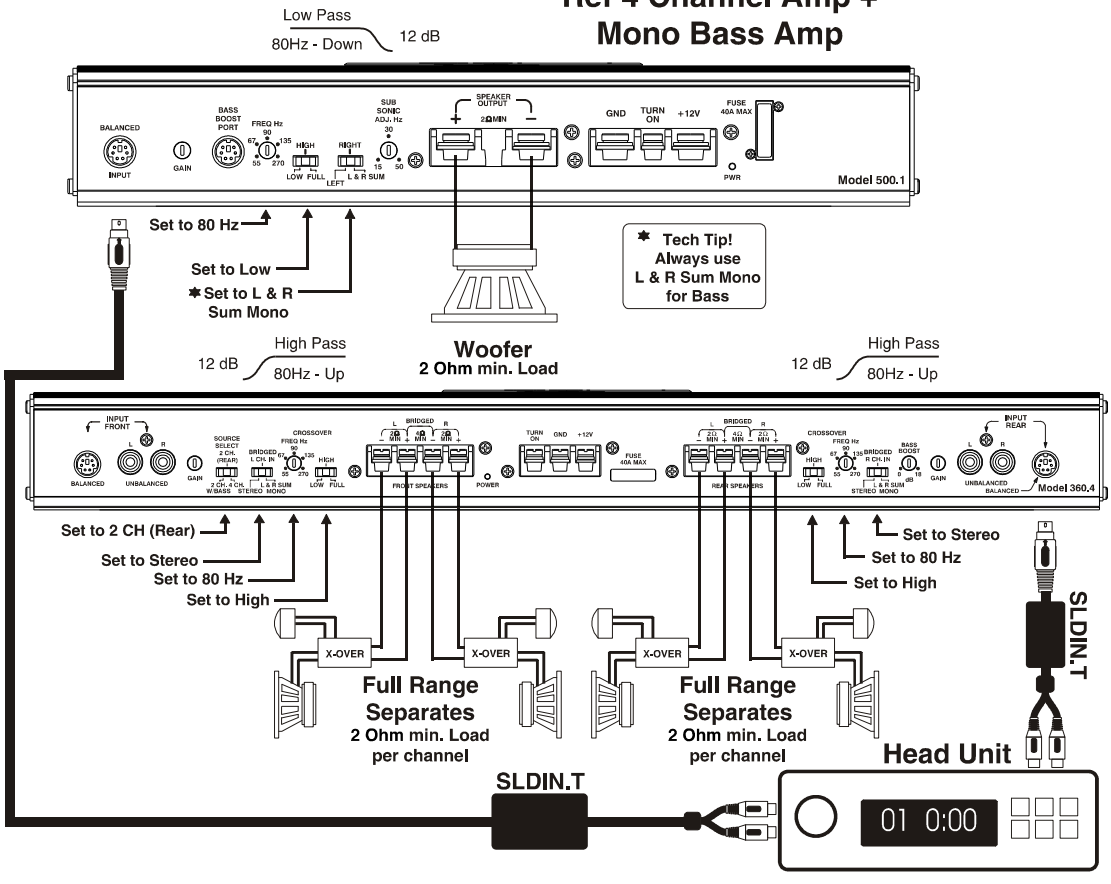
Set to Bridged R CH. IN

Head Unit

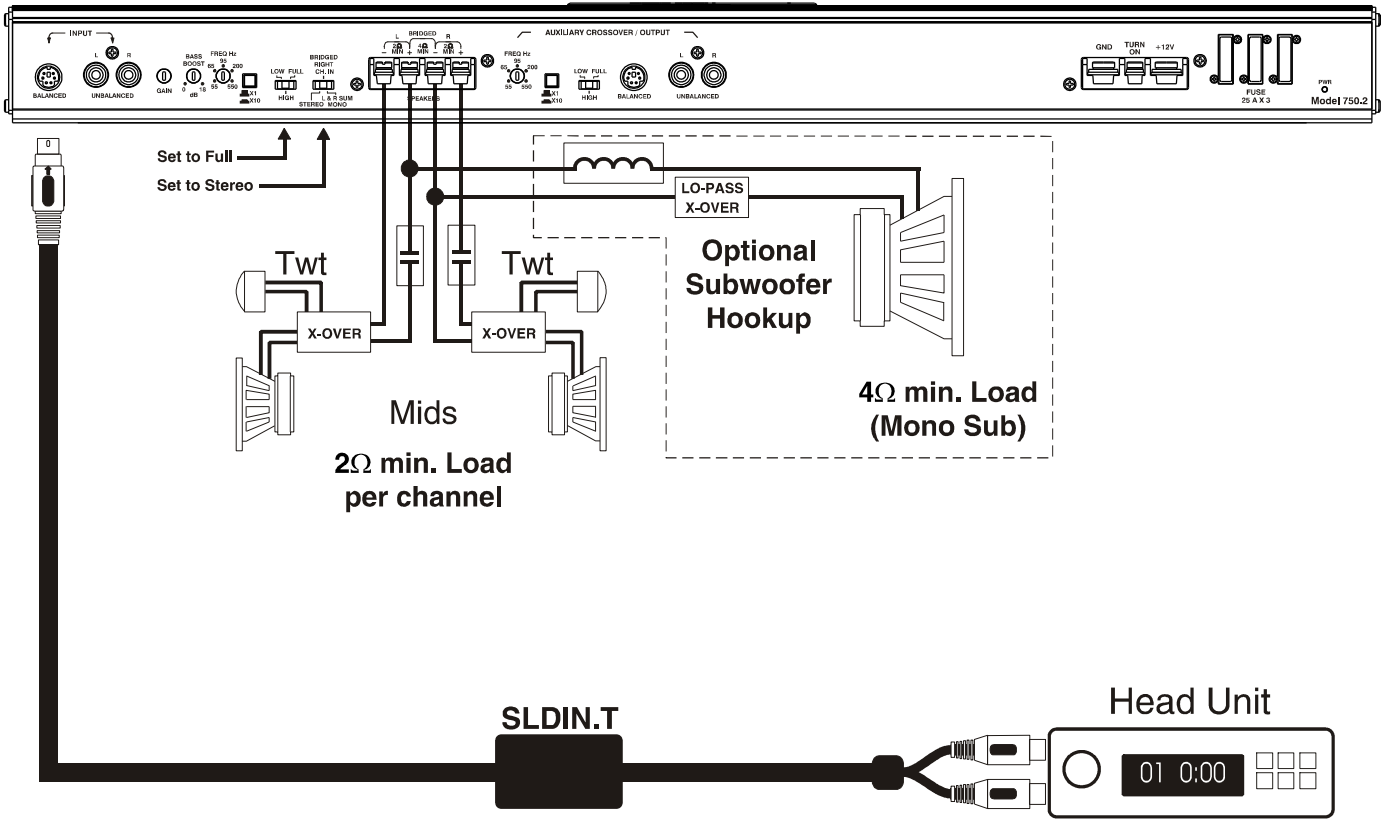
01 0:00

SLDIN.T

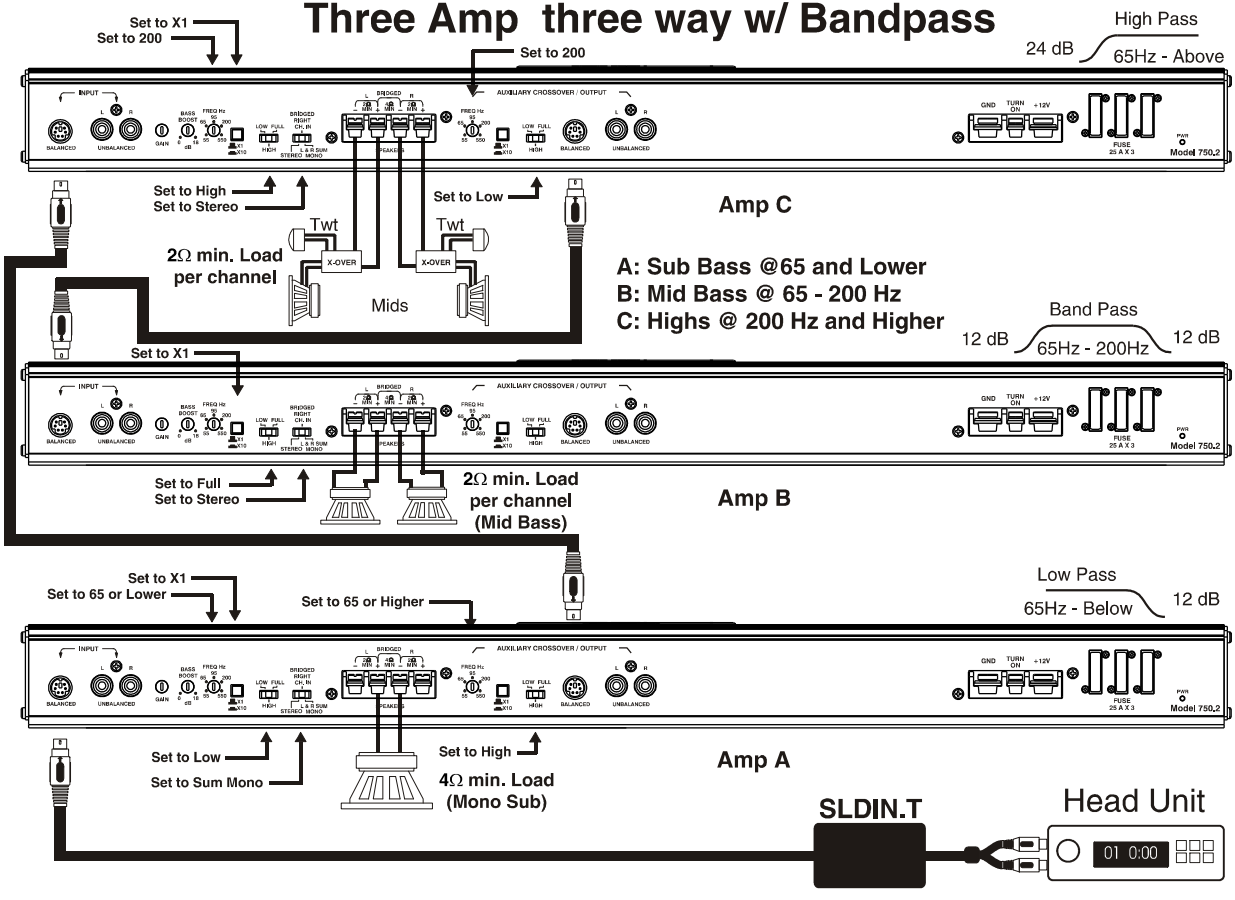
Ref 4 Channel Amp + Mono Bass Amp



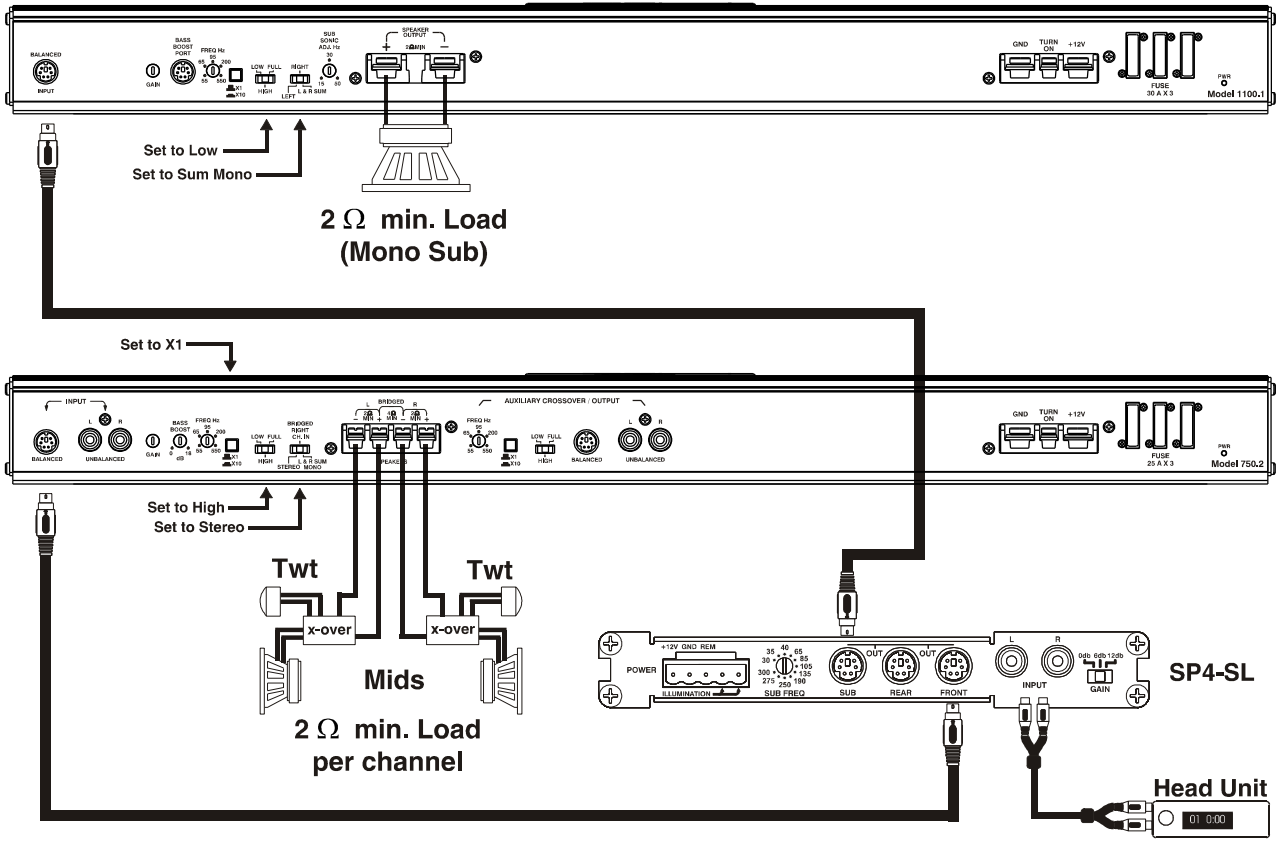
Basic Full Range System



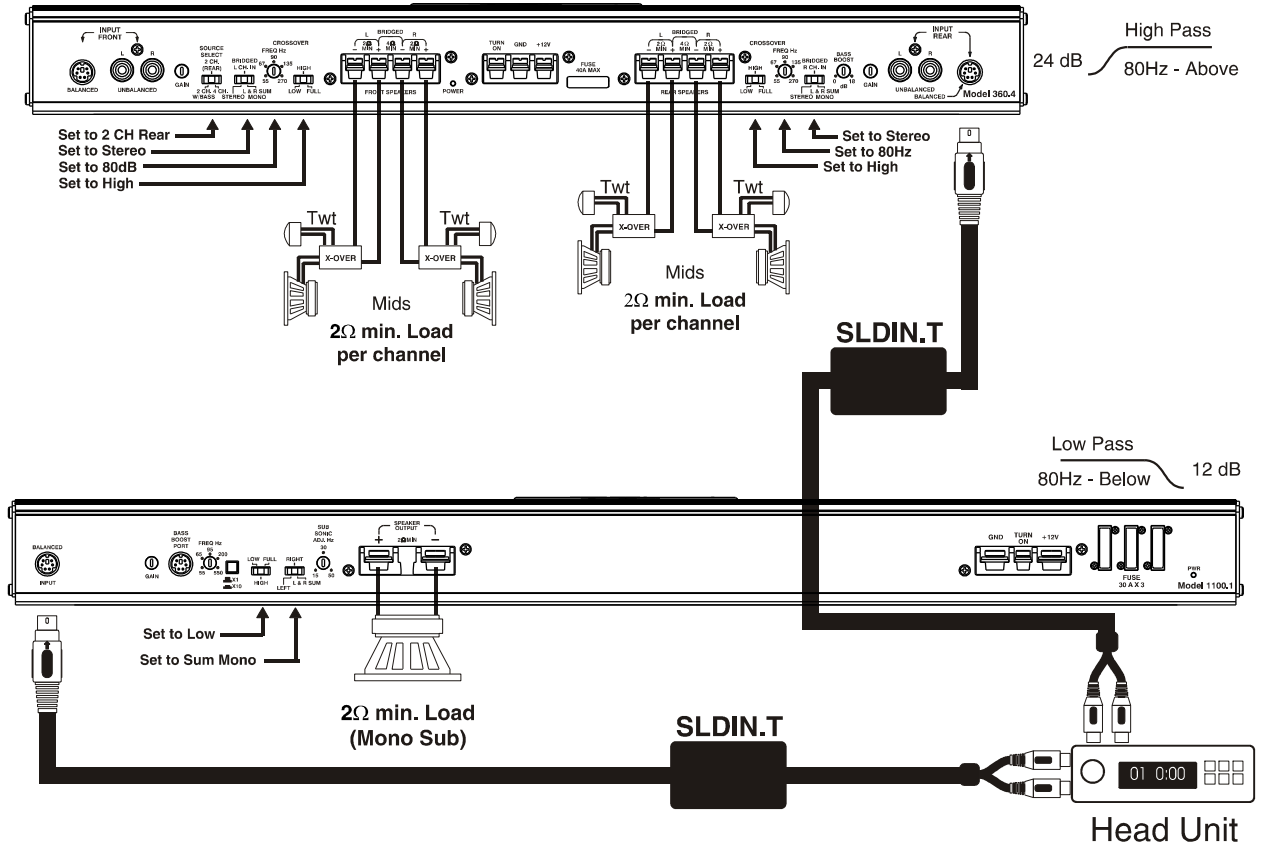
Three Amp three way w/ Bandpass



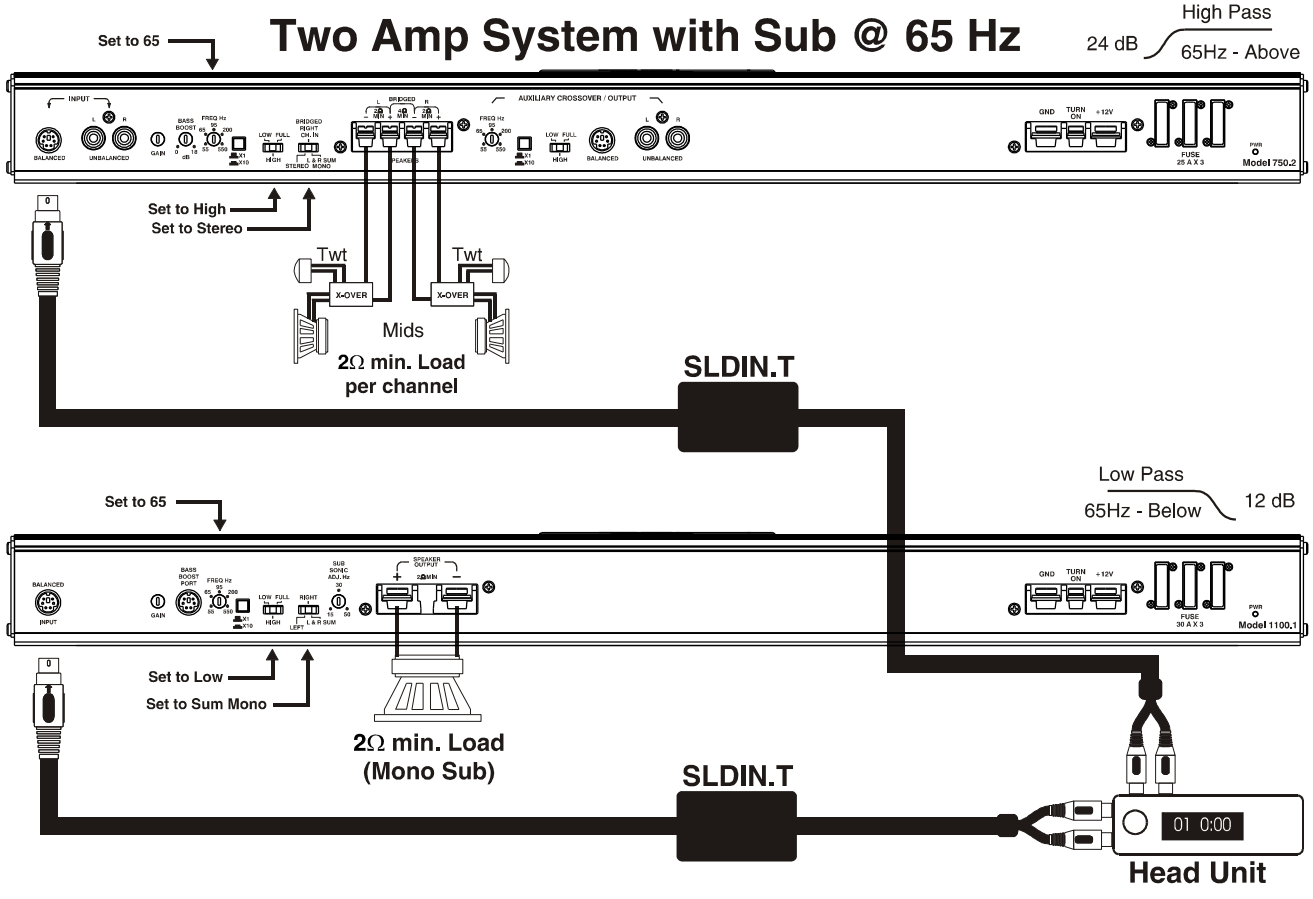
Two Way System W/ Sub Amp and Processor



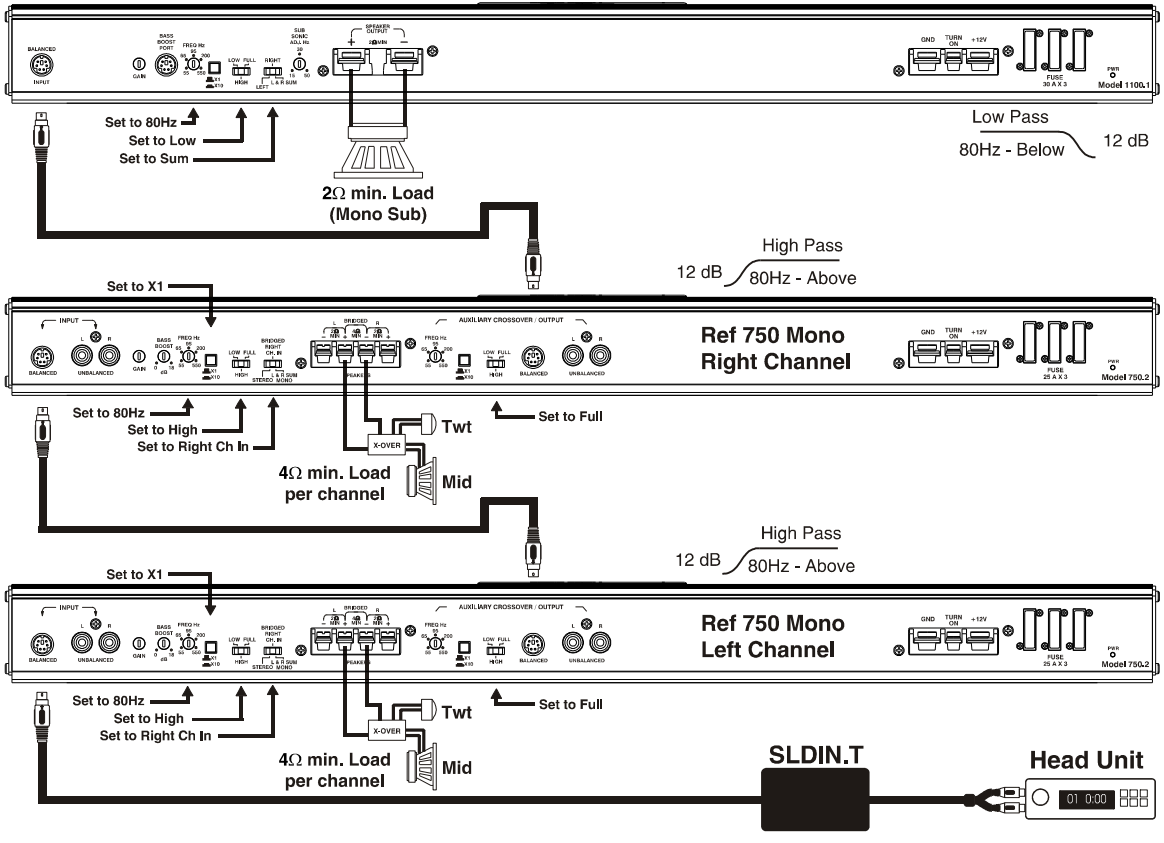
Four Channel Front and Rear W/ Mono Sub



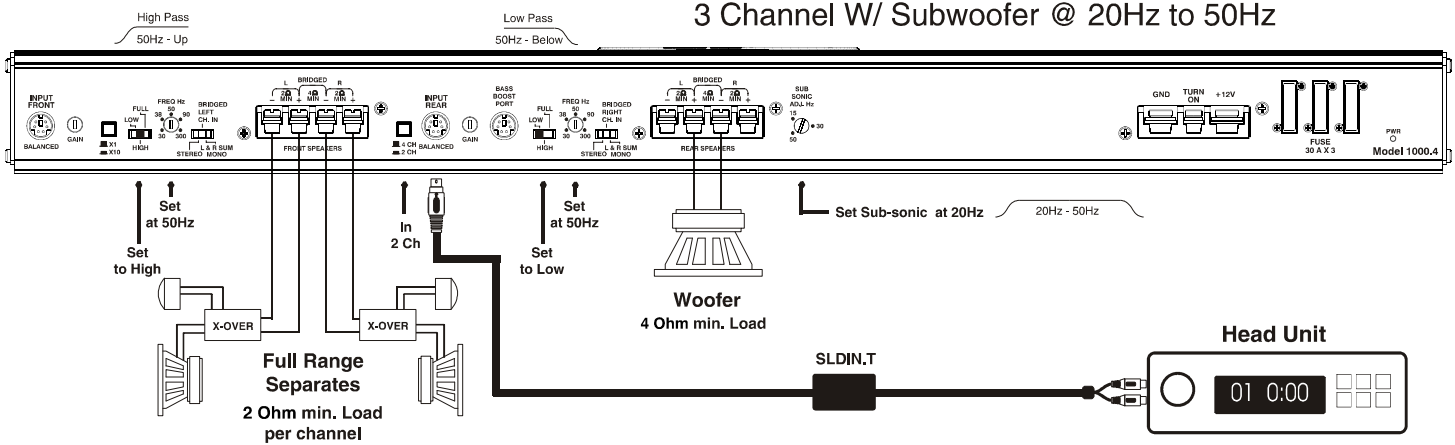
Two Amp System with Sub @ 65 Hz



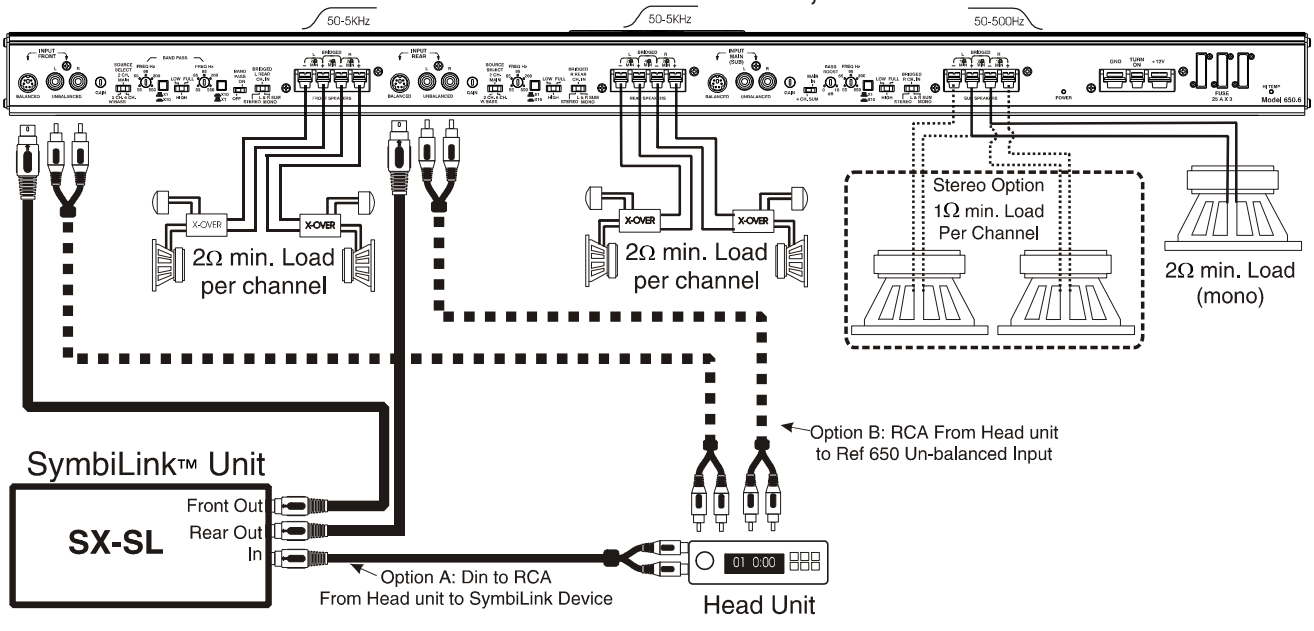
750 Watt / Channel Mid / High Plus 1100 Watt Mono Sub



3 Channel W/ Subwoofer @ 20Hz to 50Hz



Ref 650 Front / Rear in With Fade, and Summed Sub



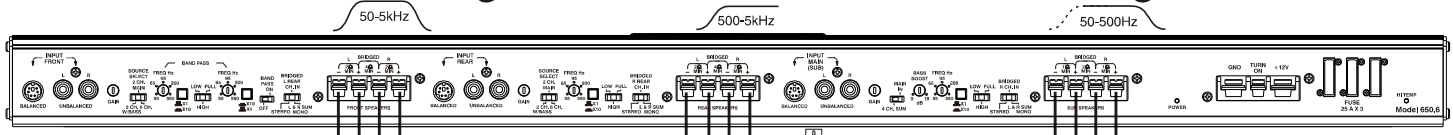
Option A: Highest Noise Rejection

Option B: Poor Noise Rejection for better noise rejection use RCA to DIN cable into the Ref 650 balanced input.

Low-Pass Band-Pass High-Pass

- All switches can be set according to this diagram except the crossover range switch (X10) which is set according to the desired frequency, the sub channel can be set to stereo or sum according to desired set up.

Ref 650 2 Channel High Pass In, Mid Bass, Mid Range, and Tweet

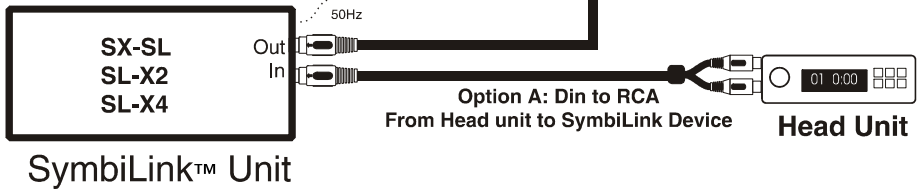


Mids
2Ω min. Load per channel

2Ω min. Load per channel (Tweeters)

1Ω min. Load per channel (mid bass)

- **The lower part of mid bass is determined by the external crossover's high pass output.**
- **All switches can be set according to this diagram except the X10 switch (set according to desired frequency).**

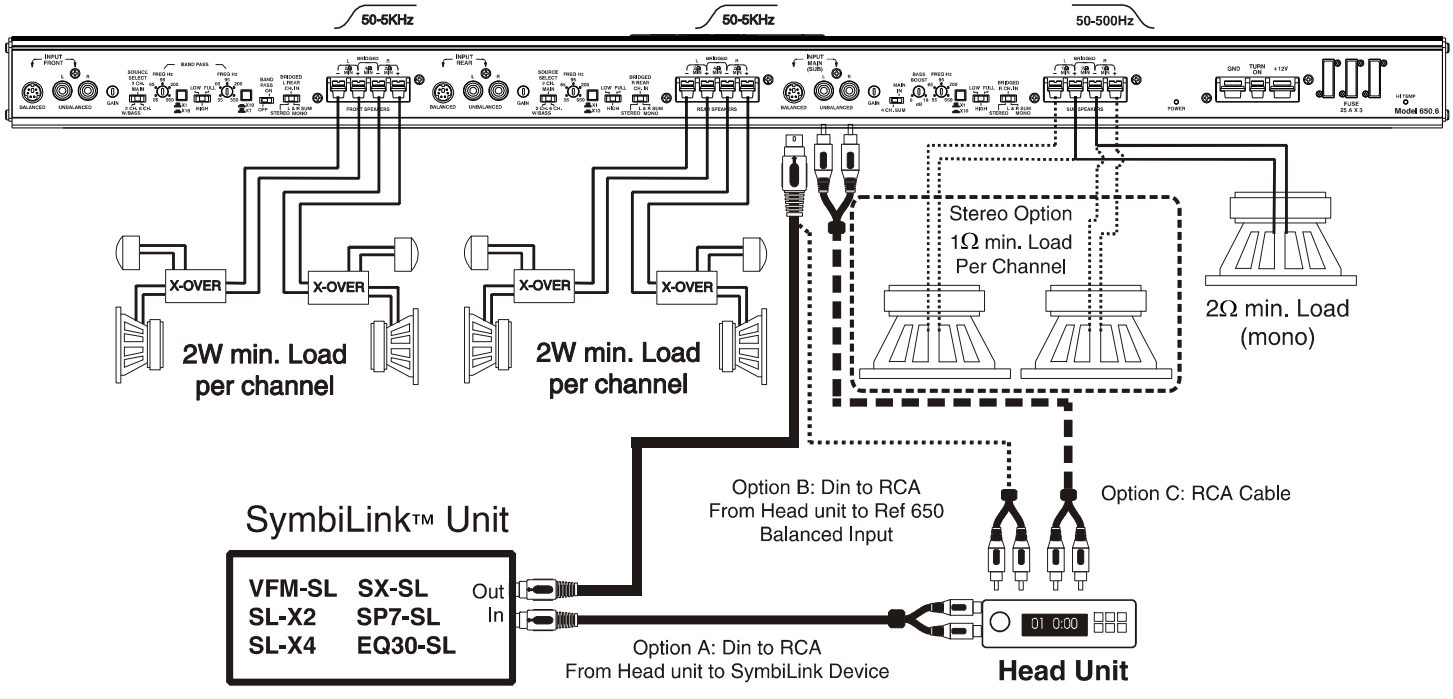


Option A: Din to RCA
From Head unit to SymbiLink Device

Head Unit

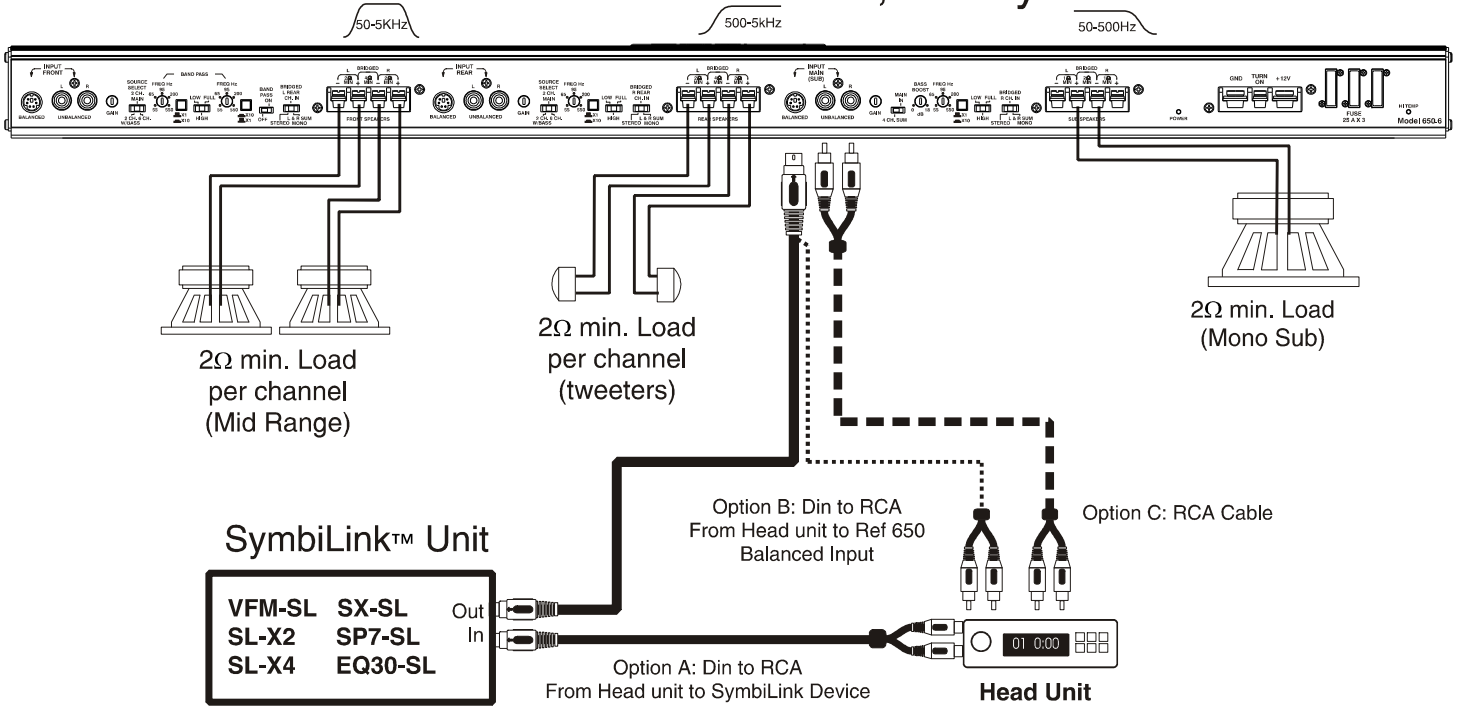
SymbiLink™ Unit

Ref 650 2 Channel In, With Sub, and F/R Out



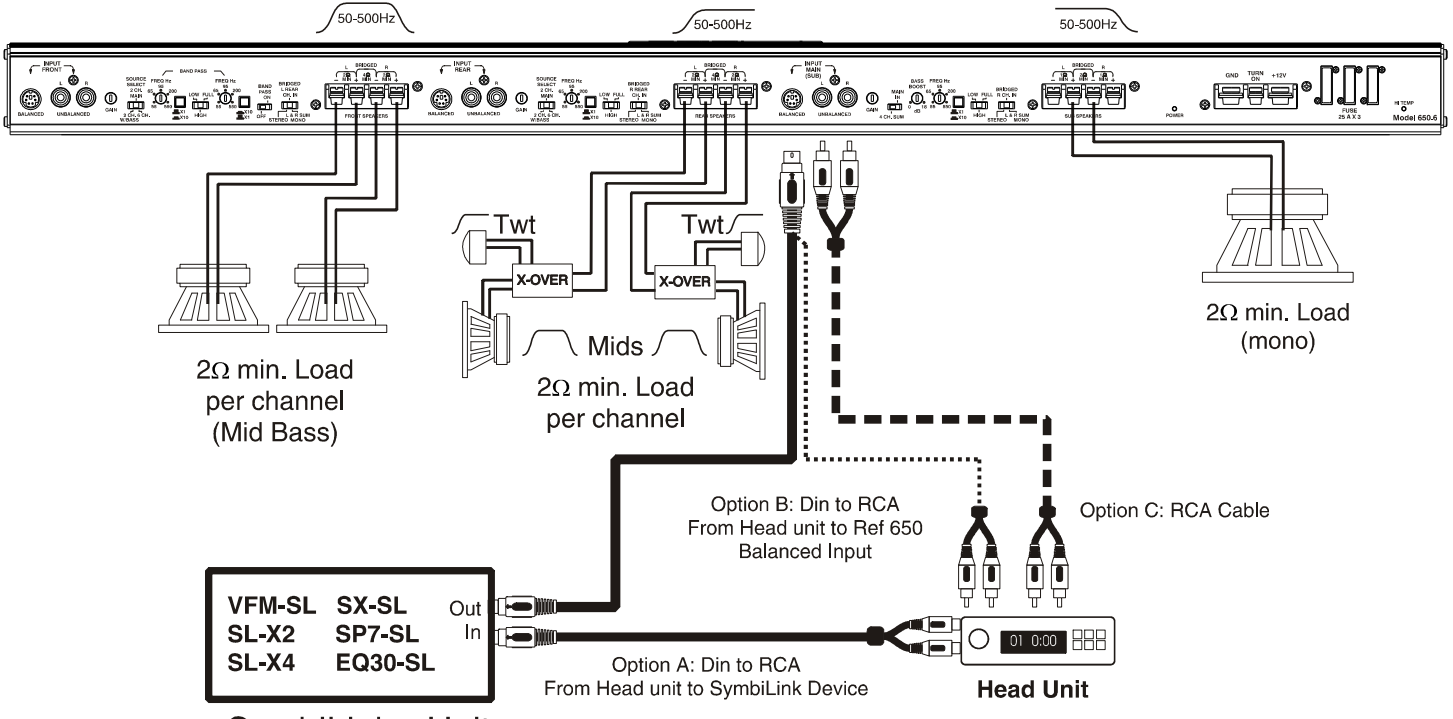
- **All switches can be set according to this diagram except the sub channels which can be set to Stereo, Bridged, or L-R Sum mono depending on the load configuration used.**

Ref 650 2 Channel in, 3 Way

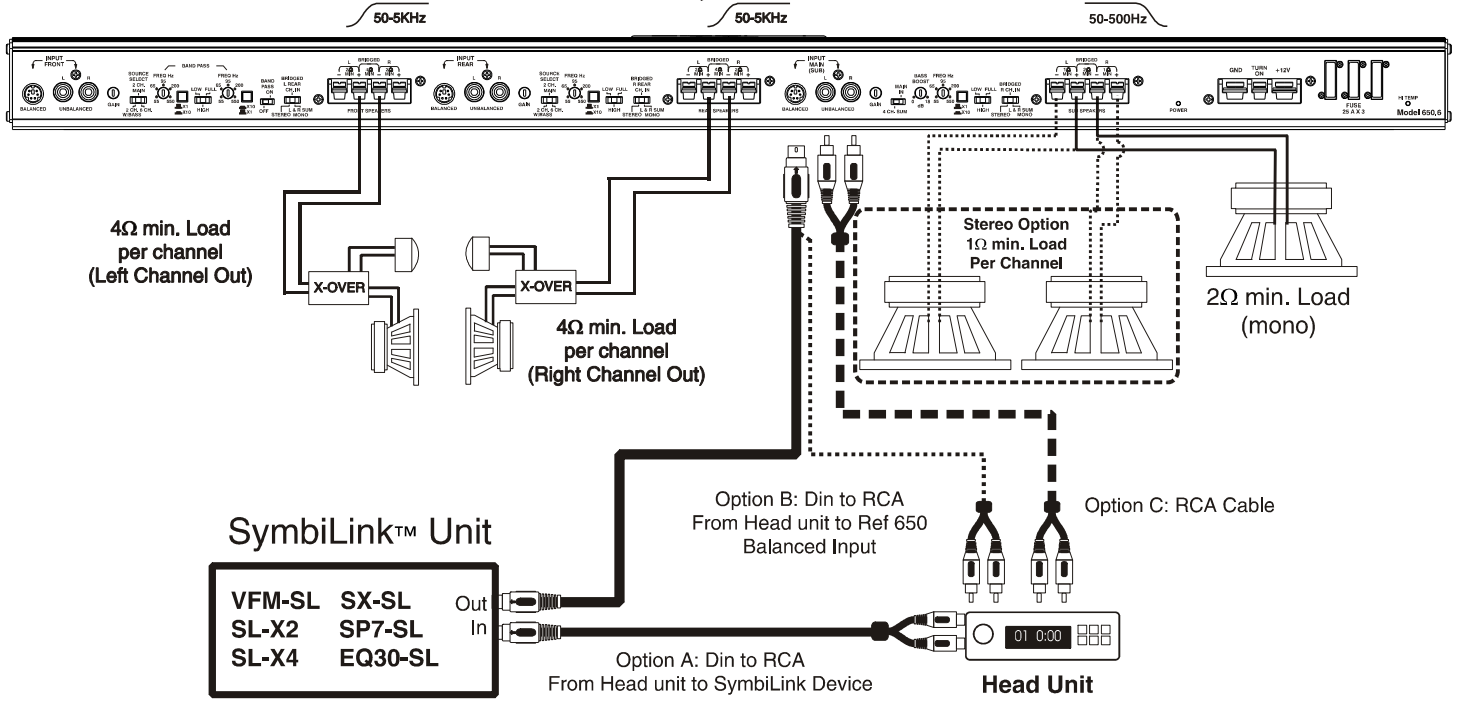


- **All switches can be set according to this diagram except the range switches which are set according to the desired frequency.**

Ref 650 2 Channel In, 3 Way + Passive (4 Way)



Ref 650 2 Channel In, 2 Channel Out With Sub



- **All switches can be set according to this diagram except the sub channels which can be set to Stereo, Bridged, or L-R Sum mono depending on the load configuration used.**

Technical Assistance

Should you experience a problem with your Reference Series amplifier, please contact the dealer that sold you this product. If your dealer is unable to solve your problem, you may contact the factory service department directly.

Phone: (209) 577-4268 Monday - Friday, 8AM - 5PM Pacific Standard Time
FAX: (209) 577-8548

Also, check our web page, www.zapco.com, for tips. You can also e-mail for technical help directly from our web page.

If you need to return this product for repair, please call the factory for a Return Materials Authorization (RMA) number. We will ask you for information that will include your name, return shipping address, daytime phone number, model and serial number, and a detailed description of your problem. A photocopy of your original purchase receipt is necessary to determine warranty status and should also be included. Once we issue you an RMA, please write it in a highly visible area on the package. ZAPCO will not accept any packages that do not have a valid RMA number clearly marked on the outside of the package.

Once you have a valid RMA number, send all repairs to:

A.R.P.A. of America Corp.
D.b.a. Zapco
Attn.: Service Department
413 S. Riverside Drive
Suite D
Modesto, California, 95354

WWW.ZAPCO.COM

A.R.P.A. of America Corp.
413 S. Riverside Drive, Suite D
Modesto, CA 95354
(209) 577-4268
Fax (209) 577-8548

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